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CONTENTS

		PAGE
High School Training and College Freshman Grades	*C. A. Smith*	401
Superior Elementary-School Readers Contrasted With Inferior Readers in Letter-Position, "Range of Attention," Scores	*H. R. Crosland*	410
Manuscript Schoolbooks	*James Mulhern*	428
The Maturity Factor in the Grade Placement of Certain Punctuation Skills in Bibliography Form	*Norma Gillett*	449
Editorials: The Need of Preventive Testing	*Leo J. Brueckner*	456
Editorials: The Over-Crowded Curriculum	*Arthur K. Loomis*	457
Reviews		460
Research Abstracts and Bibliographies		466
Research News and Communications		471

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JOURNAL OF EDUCATIONAL RESEARCH

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JOURNAL *of* EDUCATIONAL RESEARCH

Volume XXXII FEBRUARY, 1939 Number 6

HIGH SCHOOL TRAINING AND COLLEGE FRESHMAN GRADES

C. A. SMITH
University of Wisconsin

WITH our increased enrollment in high schools and colleges, and with our endeavor to find a method of predicting the ability of the high school graduate to carry college work successfully, we seem to have overlooked the widening gap between high school and college work. We have seen a great increase in the number taking courses in high school. With this increase it has become necessary for high school authorities to provide training which will meet the needs of many who cannot be fitted for college work. Adequate funds have not been provided for separate training of both groups, and as a result much of the training has been for the majority to the neglect of those who are qualified for a training to permit them to go on in the academic field. Hence any advice which may help the entering freshman should be given.

It has seemed to me for some time that there should be a better correlation between the high school work and the freshman's program to avoid some of the failures of the freshman year which seems to be the most critical of his career. It is the purpose of this paper to compare the grades and the amount of work taken in a given field of concentration with achievement in the freshman year in the University.

The high school records of the freshmen who entered the University in the years 1923-24, 1931-32, 1932-33, and 1933-34 were chosen for study. A record was made of the units of work offered by each student in the various fields studied in the high school, and the grades made by the student in each of these fields. The correlations of the grades in each of the fields and the grades made in all the work of the freshman year at the University were computed in order to see if the grades in any particular field in high school had any significant value in predicting success in college work. The results for the years 1931-32 and 1932-33 are shown as follows:

	1931-32	*1932-33*
English	.50	.52
Science	.50	.52
History	.48	.51
Mathematics	.47	.50
Foreign Languages	.47	.53
Vocational Subjects	.33	.41

If the vocational subjects are left out, these correlations show that very little difference in value can be placed on success in the various fields of high school study in predicting the student's success in college. Knowing that these correlations correspond closely with the correlations found by others, this phase of the study was not followed further.

Realizing that the freshman program in the University is made up for the most part of a continuation of studies taken in the high school, a comparison was made next of the grades made in the freshman year by those who had had the subject in high school with those who had not had the subject. In biology we found the following results: (S means grades of C or above.)

Those who did not have it in high school		Those who had it in high school	
No. of Students	% S	No. of Students	% S
593	78.75	1153	78.66

The above results show that the study of biology in high school had little or no effect on the grade of work done by the student in biology in his freshman year at the University of Wisconsin.

In Physics we found:

Those who did not have it in high school		Those who did have it	
No. of Students	% S	No. of Students	% S
92	65.21	363	65.81

Here again we do not find much of an influence by high school science on the freshman grades. However, it was interesting to note that the number taking physics as freshmen in the University dropped very markedly during the period here under investigation. Two hundred five took it in 1923-24 and only 83 took it in 1933-34.

In Chemistry we found that of			
Those who did not have it in high school		Those who had it in high school	
No. of Students	% S	No. of Students	% S
997	56.67	1481	78.66

Here we see a distinct advantage for those who had the subject in high school.

In foreign language we found a new factor. Students presented all the way from no units in high school to eight or more units of it. In order not to complicate the study, comparisons were confined at first to those who presented units in only one foreign language.

No. of Units	No. of Students	% S
0	473	41.64
1	184	46.19
2	1195	52.97
3	252	73.01
4	398	78.40

Here as with Chemistry, we note an increased ability of the student to handle foreign language as a freshman by having had it in high school. Here we note also, as could not be noted in Chemistry since one year only is offered in that field, that each additional unit seemed to indicate an increased ability in language. Further study showed that four years in one language seemed to serve better for college language study than two years each of two languages.

In the study of Mathematics we have something of the same set-up as in the foreign language except that during this period every entering student was required to present at least two units in mathematics. Because of this requirement a number of the students, especially in Engineering, had to take sub-freshman mathematics for a semester without credit. The results are given below:

No. of Units Presented	No. of Students	% Taking Sub-Freshman Work	% Taking Regular Work	% S
2	787	10.17	89.83	52.53
2½	416	8.89	91.11	61.17
3	698	7.16	92.84	72.21
3½	238	3.78	96.22	75.09
4	242	.81	99.19	72.81

Those students who presented four units for entrance were required, in most cases, to take advanced courses in mathematics, as they could not

get credit for college algebra or trigonometry taken in college since they are considered a repetition of high school work. This undoubtedly accounts for the slightly lower percentage made by these students than by those who presented three and one-half units.

In the field of History, we find a somewhat different result.

No. of Units Offered	No. of Students	% S
1	550	61.09
2	1880	58.24
3	941	59.29
4	30	43.33

Here we find that those who offered only one unit did better than those who offered more, and there seems to be little of value to the student in his high school training for successful work in history in his freshman year at the University of Wisconsin. The number offering four units is small, but the numbers offering one, two and three units are large enough to be significant.

With the foregoing data before us, the question naturally arose whether the training in high school had helped the student or whether the college aptitude of the pupils who had taken chemistry, foreign language, and mathematics accounted for the difference. Or possibly the extra units of history only indicate that the high school pupil had elected the easier subject in high school to avoid work.

In order to answer these questions we redivided the students into quartiles according to their scores on the aptitude tests administered to all entering freshmen. These figures will not be the same as those given above inasmuch as the aptitude test scores for the freshmen who entered in 1923-24 were not available, nor were they available for everyone entering the other three years. In foreign language comparisons were made on the total number of units regardless of the distribution of the units in the various fields.

The results of this study are given below:

BIOLOGY

Without High School Training			With High School Training	
No. of Students	% S	Quartile	No. of Students	% S
123	90.23	Highest	209	91.38
129	85.26	Second	249	87.93
88	71.57	Third	222	74.76
54	68.51	Fourth	166	76.48

PHYSICS

Due to the small numbers in the lower quartiles we divided the students in Physics into the upper half and the lower half.

Without High School Training		With High School Training	
No. of Students	% S	No. of Students	% S
	Upper Half		
40	70	156	78.67
	Lower Half		
11	72.72	58	43.07

CHEMISTRY

Without High School Training			With High School Training	
No. of Students	% S	Quartile	No. of Students	% S
		Highest Quartile		
175	77.12		362	90.04
		Second Quartile		
187	62.02		312	80.11
		Third Quartile		
160	51.24		237	70.03
		Fourth Quartile		
132	36.35		130	56.14

It is interesting to note that students in each quartile with high school training did better than those in the quartile above without high school training.

FOREIGN LANGUAGE

In foreign language we do not have the simple comparisons we have in the sciences. We compared the students without foreign language with those students who had all the other units up to 8 units for the quartile.

No. of Units	No. of Students	% S
	Highest Quartile	
0	48	54.15
1	17	88.22
2	238	76.46
3	96	83.32

4	283	84.43
5	83	83.11
6	130	93.06
7	42	88.08
8	10	100.00
	Second Quartile	
0	47	51.05
1	32	59.37
2	251	54.16
3	93	56.98
4	211	72.97
5	73	78.06
6	64	93.74
7	15	100.00
8	5	100.00
	Third Quartile	
0	79	43.03
1	14	21.42
2	198	47.97
3	64	51.55
4	129	65.88
5	26	49.98
6	15	60.00
7	6	83.33
8	1	100.00
	Fourth Quartile	
0	63	23.80
1	25	32.00
2	124	33.05
3	25	28.00
4	55	50.89
5	6	66.66
6	10	60.00
7	1	100.00
8	—	—

MATHEMATICS

No. of Units	No. of Students	% S
	Highest Quartile	
2	134	71.63
2½	76	76.30
3	175	82.85
3½	73	84.91
4	80	83.75
	Second Quartile	
2	177	54.22
2½	67	64.17
3	161	69.55
3½	41	80.48
4	40	62.00
	Third Quartile	
2	154	51.28
2½	35	51.41
3	96	64.58
3½	26	73.07
4	28	57.13
	Fourth Quartile	
2	99	40.40
2½	31	38.69
3	39	51.27
3½	14	42.85
4	6	16.66

HISTORY

	Highest Quartile	
0	8	62.50
1	140	72.84
2	429	74.34
3	168	80.94
4	5	60.00

	Second Quartile	
0	2	100.00
1	116	65.50
2	401	59.33
3	145	62.73
4	6	33.33
	Third Quartile	
0	3	66.66
1	67	40.29
2	316	43.34
3	129	49.61
4	3	33.33
	Fourth Quartile	
0	2	0
1	22	31.81
2	195	30.24
3	77	28.56
4	4	25.00

ENGLISH

A large majority of the students took four years of English in high school. Practically none took less than three years. The results of our study in English show the advantage of taking the fourth year, as indicated by the figures below.

3 Units in High School		4 Units in High School	
No. of Students	% S	No. of Students	% S
	Highest Quartile		
181	92.82	1040	95.33
	Second Quartile		
182	75.56	980	88.77
	Third Quartile		
129	55.03	763	74.69
	Fourth Quartile		
79	45.56	475	49.88

These results seem to indicate that high school advisers may help the pupils who plan to go to the University and enter some particular course by pointing out to them what will be required in the course they have chosen and what subject matter seems to be the best preparation for the course. Some pupils, it would seem, should be advised to take another year of English or more mathematics or to continue a foreign language or some particular science to fit into the University program successfully.

Freshman advisers at the University may help certain students too by pointing out to them that they should not elect chemistry or foreign language in the freshman year if they have not had either in high school. They might also advise those who have had four years of history in high school to postpone the study of history for at least a year so as to get the college point of view.

Many other possibilities may be seen by both the high school and the University advisers from the data presented.

SUPERIOR ELEMENTARY-SCHOOL READERS CONTRASTED WITH INFERIOR READERS IN LETTER-POSITION, "RANGE OF ATTENTION," SCORES[1]

H. R. CROSLAND
University of Oregon

INTRODUCTION

SEVERAL published[2] and unpublished[3] papers by the author and his collaborators have presented letter-position, "range of attention," results obtained from right-handed *versus* left-handed and right-eyed *versus* left-eyed subjects of the college level. The most significant of these results has appertained to the fact that, from a field of nine adjacent letters of the alphabet presented tachistoscopically in nonsense arrangement for 1/10 sec. (1000), the leftmost letters were reported with higher efficiency by the right- than the left-eyed subjects and rightmost letters were reported with higher efficiency by the left- than the right-eyed subjects. This result one may grasp more clearly by observing

[1] The writer is heavily obligated, for kind coöperation and helpful aid, to Superintendent H. R. Goold, Principals G. H. Good and W. L. Van Loan of the Edison and Roosevelt Schools, the Principals of the Condon and Francis Willard Schools, and to many individual teachers, of Eugene, Oregon. Further acknowledgment of indebtedness is due Miss Della Rush, who applied tests of eye-dominance and hand-dominance to the inferior children, and applied the tachistoscopic test to most of the children. Drs. Gavin Dyott and Sam Taylor gave freely of their time and technical skill in testing the vision of the subjects. And, finally, clerical help for scoring, etc., was financed through Federal funds administered through appropriate committees of the University of Oregon.

[2] Four published papers, bearing on our present thesis, are: (1) Crosland, H. R., and Anderson, I. H. "A Method of Measuring the Effects of Primacy of 'Report' in the 'Range of Attention' Experiment," *American Journal of Psychology,* XLV (1933), pp. 701-713; (2) Crosland, H. R., and Anderson, I. H. "The Effects of Eye-Dominance on (Letter-Position) 'Range of Attention,' Scores," *University of Oregon Publication,* IV (1933), pp. 1-23; (3) Crosland, H. R., and Anderson, I. H. "The Effects of Handedness on (Letter-Position) 'Range of Attention,' Scores," *University of Oregon Publication,* IV (1934), pp. 1-16; and (4) Crosland, H. R., and Anderson, I. H. "The Effects of Combinations of Handedness and Eyedness on Letter-Position, 'Range of Attention,' Scores," *University of Oregon Publication,* IV (1934), pp. 1-48.

[3] Three unpublished papers represent the Master of Arts theses as follows: (1) Stromberg, E. L. "Monocular and Binocular Letter-Position Scores of Defective (College) Readers in the 'Range of Attention' Experiment," *Master's Thesis,* University of Oregon, (May, 1934), pp. 1-101; (2) French, E. F. "A Comparison of Defective with Normal College Readers with Respect to Monocular and Binocular Differences in Letter-Position Scores in the 'Range of Attention' Experiment," *Master's Thesis,* University of Oregon (June, 1935), pp. 1-71; and (3) Buxton, C. E. "Reliability and Validity Measures of Tests for Eye- and Hand-Preference," *Master's Thesis,* University of Oregon (June, 1935), pp. 1-108 + xx.

Figures IIA—1 to 3. It has recurred in different investigations, regardless of whether or not the fixation of the eyes has been directed at the left, at center, or toward the extreme right of the field. However, under left-field fixations (those forced by *right-print* exposure materials), which one may imagine to be the ideal fixation for efficient reading, the effects of eye-dominance were least in evidence. Under central fixations (which, with right-field fixations, all too frequently characterize many defective readers, we believe), the above effects were most pronounced. They are also to be discovered in results obtained for extreme right-field fixations, that is, from reports of *left-print* materials.

So obvious and so recurring, in table after table and in figure after figure, were these facts that we were tempted to prophesy[4] that an investigation of defective readers would reveal two striking conditions, namely: (1) defective readers, independent of the question of eye-dominance, reveal greatly augmented right-field, letter-position scores, while superior readers greatly outshine them on scores for left-field positions; and (2) a majority of defective readers possess left-eye dominance while a majority of superior readers exhibit right-eye dominance.

PROCEDURE

Plans were effected, early in the session of 1933-1934, for confirming or refuting these hypotheses. Arrangments were formulated and executed whereby the teachers of reading in all elementary-schools and in the first-year of junior high school selected, by school grades and general observation, all children 10.5 years old or older, of normal or higher I.Q., who ranked in the lowest quartile in reading ability. Then these subjects, one by one, were tested: (a) in the "range of attention," tachistoscopic, experiment[5] (requiring an hour on each of three days);

[4] See footnote 2, reference 1 (p. 705) and 4 (p. 15), above.

[5] A Dodge mirror-tachistoscope flashes material before the eyes, in this case for 125σ (⅛ of a second). Each card of exposure carries 9 18-point, lower-case letters in nonsense arrangement. There are 270 such cards: 90 for each eye and 90 for binocular presentation. Each 90 is subdivided into 3 groups of 30 each; one set for *left-prints*, forcing fixation on the 9th or rightmost letter exactly in the center of the card from left to right; the second set for *center-prints*, forcing fixation on the 5th or middlemost letter; and the last set for *right-prints*, forcing fixation of the 1st or leftmost letter. Each set, of 30, is further subdivided into three groups of 10 each; one to be reported from left-to-right, another to be reported from right-to-left, and the last to be reported from the center outward, alternately from right to left. The entire 270 are thoroughly shuffled and presented to a subject in random order but in the same order for all subjects. Never before a presentation does the subject know to which eye the presentation will occur, what type of print will be used, nor what order of report he will be asked to effect immediately after a presentation. All these

and (b) for hand- and eye-dominance (see Table IIB). The selections, curtailed by failures to complete all tests, taking the tests after many of the results had been worked up, etc., gave a net group of 34 defective child subjects. A similar procedure was followed the subsequent year (1934-1935) with respect to the superior readers. The teachers of reading selected them, and the testing was effected by us. The tachistoscopic apparatus, materials, and procedure were identical as between both groups of subjects. The superiors, however, were tested somewhat differently (more efficiently) for eye-dominance (see Table IIB). The net group of superior readers contained 31 subjects.

RESULTS

The results of the tests will now engage us. They are differentiated into two groups, in the order of the more important first. Group I will deal with the selections of the children as being superior and inferior readers (A), and with differential results in letter-position scores as between them in the "range of attention" experiment (B). Group II will treat of eye-dominance difference between the two sets of readers, as ascertained by comparing the letter-position scores of the children with those of Crosland's and Anderson's college subjects (A), and by our own tests of dominance (B).[6]

latter devices are to force fixation in the center of the card and to prevent order of report from vitiating fixation and altering its natural effects. Shutters, and string attachments to the chronoscope, permit the elimination of one or the other eye, just at the moment of exposure: the subject seldom knows, even during exposure, which eye is screened off and which is unobstructed. Each condition of the experiment, therefore, is represented by 10 samples, but the three methods of report are consolidated or pooled or averaged, but the three methods of report are consolidated or pooled or averaged, thus giving 30 samples for each condition of print (fixation) for each eye, and for binocular results. Finally, in the results, a grand pooling of the three prints affords a sampling of 90 cards of exposure for each ocular condition.

[6] The original plans, if adhered to, would have enabled us to show, in addition, the results obtained by two oculists who examined the vision of many of the children. But three circumstances, unfortunately, make the showing of such results impossible: (1) it has proved impossible to persuade all children to visit the oculist; (2) rush of work required the assistance of two oculists, using somewhat divergent techniques; and (3) by the time we could request the measurements, some of them had been misplaced in the office of one of the oculists (two years were required for testing the children, they making sporadic and delayed visits to the oculists, and an additional year has been consumed in working up the results and preparing this paper). A table of eye-measurements, fairly complete for the defective readers, has been effected, but the lack of a comparable table for the superiors makes its publication useless.

TABLE I A

PUBLIC SCHOOL RECORDS SERVING TO DIFFERENTIATE SUPERIOR FROM INFERIOR READERS
(OBTAINED BY US IN MAY, 1936, BUT ENTERED ON THE JUNIOR HIGH SCHOOL BOOKS AS OF JAN. 22, 1936)

				Stanford Achievement			Unit Achievement			
	Chronological Age (yrs. mos.)	Mental Age (yrs. mos.)	I.Q.	Paragraph Meaning (E.A.)	Word Meaning (E.A.)	GENERALIZED (E.A.)	Comprehension (E.A.)	GENERALIZED (E.A.)	Class records in reading (Elem. Sch.) (if available)	School (Primary)
Inferior Child Readers										
Child No.										
1.										Condon
2.	13.5	14.6	109	13.5	12.6	13.0	12.2	13.4		Edison
3.										Edison
4.	14.11	13.6	90	13.5	12.0	12.3	**12.8	**11.6	3	Edison
5.	14.1	13.7	100	12.6	12.6	11.8	**12.2	**12.2	3	Edison
6.	14.10	16.0	108	14.6	14.6	14.11	*15.6	*14.11		Edison
7.										Edison
8.										Condon
9.										Edison
10.	12.10	16.0	124	14.8	13.11	14.8	*15.6	*14.8	2	Edison
11.	13.2	13.3	100	12.7	12.2	12.6	*12.11	*11.3	3	Edison
12.	13.5	11.6	85	12.10	12.2	12.4	*13.6	*13.2	3	Edison
13.										Roosevelt
14.	14.0	11.8	82	12.11	10.9	11.9	*10.6	*11.8	4	Condon
15.	14.3	15.4	107	15.9	16.2	14.8	*15.6	*15.2		Edison
16.										Edison
17.	15.6	9.2	66	10.8	11.2	10.9				Roosevelt
18.	14.4	13.6	94	14.1	14.10	12.8	**10.6	**12.6	3	Condon
19.	14.5	13.0	90	13.1	12.11	11.8	13.8	12.6	3	Condon
20.	13.0	11.8	83	12.11	11.4	11.9	**11.5	**10.6	4	Edison
21.	15.6	14.4	92	14.6	12.11	14.1	*12.2	*14.0		Condon
22.										Condon
23.	12.6	11.8	92	14.4	12.2	12.6	*11.8	*11.6	3	Edison
24.	14.1	16.4	115	16.3	15.11	14.8	**16.2	**14.8	3	Condon
25.										Edison
26.	14.0	16.3	110	15.2	16.3	16.0	14.10	13.0	3	Francis Willard
27.										Washington
28.										Condon
29.										Edison
30.										Edison
31.	13.10	10.2	73	10.9	10.6	11.5	*10.7	*10.6	5	Edison
32.	13.3	13.6	101	11.6	11.11	13.3	*11.6	*12.0	4	Edison
33.	13.5	14.6	106	14.6	14.4	14.4	*14.4	*13.8	3	Condon
34.	13.11	15.8	112	17.0	14.4	14.8	*11.10	*14.6		Roosevelt
Mean (N = 21)	13.10	13.7	097	13.8	13.0	13.1	13.0	12.11	3.3	

TABLE I A—*Continued*

Child No.	Chronological Age (yrs. mos.)	Mental Age (yrs. mos.)	I.Q.	Stanford Achievement: Paragraph Meaning (E.A.)	Stanford Achievement: Word Meaning (E.A.)	Stanford Achievement: GENERALIZED (E.A.)	Unit Achievement: Comprehension (E.A.)	Unit Achievement: GENERALIZED (E.A.)	Class records in reading (Elem. Sch.) (if available)	School (Primary)
Superior Child Readers										
1.	13.1	17.4	131	17.0	16.8	16.8	**17.2	**14.4	2	Roosevelt
2.	13.7	15.4	114	16.5	16.0	15.8	**15.8	**13.0	2	Roosevelt
3.	11.11	16.11	141	17.2	16.3	15.6	*16.6	*14.3	1	Condon
4.	12.5	16.0	128	17.0	16.8	16.3	*14.10	*14.1	1	Edison
5.	11.10	17.4	147	17.4	17.4	16.8	**16.8	**16.8	1	Condon
6.	12.10	16.0	127	16.0	15.8	15.8	**16.8	**13.5	3	Roosevelt
7.										Edison
8.	12.8	16.0	124	16.2	15.8	15.6	*14.0	*14.0	1	Edison
9.	12.10	16.8	136	16.2	15.2	15.11	**16.2	**14.3	1	Roosevelt
10.										Condon
11.	12.3	14.10	116	14.4	15.0	14.1	15.3	13.7	3	Condon
12.	11.11	17.4	148	18.5	18.8	18.6	**17.8	**16.10	1	Roosevelt
13.										Condon
14.	12.0	17.4	142	16.10	16.2	16.0	*17.2	*17.0	1	Condon
15.	11.10	14.6	121	14.1	15.4	13.3	**12.10	**12.10	2	Edison
16.										Roosevelt
17.	12.5	16.11	137	18.5	19.8	18.2	**17.8	**16.8	1	Roosevelt
18.										Edison
19.	12.0	16.4	135	17.4	15.11	16.3	**15.8	**14.10	2	Condon
20.										Condon
21.	12.0	14.10	124	16.5	15.8	15.6	*16.2	*14.6	2	Condon
22.	13.04	15.2	113	16.2	15.6	15.6	**17.6	**14.0	2	Roosevelt
23.	11.5	16.8	144	17.6	16.0	15.8	*16.10	*15.11	1	Edison
24.	13.2	13.6	110	13.7	14.6	12.11	*15.3	*13.0	2	Edison
25.	13.8	16.8	120	15.9	19.8	16.6	**16.6	**14.10	1	Roosevelt
26.	12.3	16.8	135	17.11	16.2	16.3	*16.7	*15.6	2	Edison
27.	12.5	16.0	127	16.2	16.3	15.4	*15.4	*14.7	2	Edison
28.	12.5	16.8	133	16.2	15.8	15.9	*17.2	*15.10	1	Edison
29.	13.8	16.11	129	19.8	19.2	16.5	**17.2	**15.8	2	Roosevelt
30.										Roosevelt
31.	12.6	4.3	113	16.5	15.9	14.4	*13.3	*13.8	2	Condon
EXTRAS										
32.										Francis Willard
33.	12.0	14.3	119	16.8	17.0	15.11	16.8	15.9	2	Francis Willard
34.	12.3	13.6	110	15.2	13.1	13.1	*14.0	*14.0	1	Francis Willard
35.	11.5	13.4	117	15.8	15.9	15.3	17.0	14.2	1	Francis Willard
36.	11.7	13.9	119	15.9	14.10	14.4	16.10	15.5	1	Francis Willard
37.	12.1	16.8	138	16.0	16.10	15.0	*14.0	*14.0	2	Francis Willard
38.	11.5	14.7	128	17.6	16.5	16.2	17.0	15.5	2	Francis Willard
39.	11.11	13.11	117	15.9	15.11	14.8	*16.11	*13.8		Francis Willard
Mean (N = 31)	12.4	15.8	127	16.6	16.4	15.6	16.1	14.8	1.6	

Blank = records not available.
* = Unit Achievement test administered 1935.
** = Unit Achievement test administered 1934.

Note: Class records in reading, earned in Elementary School in the years '33, '34, or '35, the children brought with them into Junior High School. The Unit Achievement test was applied in 1934 or 1935 in Elementary School. All other records were obtained, in Junior High School, on Jan. 22, 1936.

IA, Selection of Subjects. Table IA, fairly complete for each group of subjects, shows the average age of the defective readers (as of Jan. 22, 1936) to be 13 years, 10 months and of the superior readers to be 12 years, 4 months. At the time of our tests, the defectives approximated a mean age of 11 years 10 months and the superiors 11 years and 4 months. So, age differences cannot be used to explain results which are yet to follow. The mean IQ of the defectives is 0.97 (which is certainly not sub-normal), and of the superiors is 1.27 (a value which is superior). Hence, the single factor of differences in I.Q. cannot be applied to explain our results, certainly not for the fourth-quartile rank of the defective readers in their class-work. The mean class grade, in reading, for the defectives is 3.3 and for the superiors is 1.6. Nor are the inferiors markedly below educational-age expectations on the Stanford Achievement and Unit Achievement tests (as of Jan. 22, 1936,—administered after the lapse of two years, which may have afforded opportunity for remedying defective reading habits). Merely by contrast with the superiors, who are greatly above educational-age expectations (amounting to approximately 4 years' advancement), are they shown to be inferior. Yet, notwithstanding this apparent absence in the inferiors of subnormality in achievement, our results to follow do check with the teachers' estimates of large differences between the two groups in reading ability.[7] It is interesting to observe that the teachers had selected as

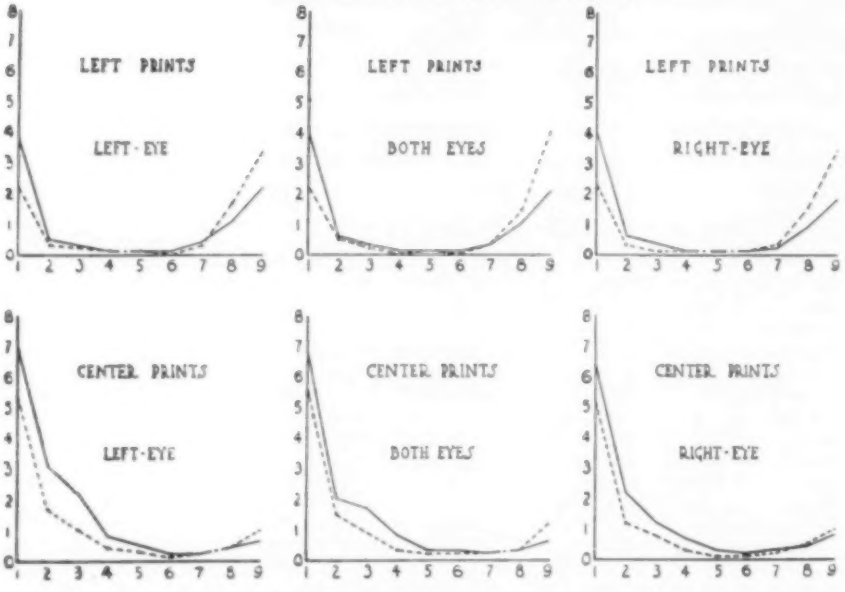
[7] Some question has been raised as to the general ranking of the entire school system of Eugene, Oregon, in both the efficiency of its teaching of reading and in the personnel it draws into its pupil population. The further question has arisen of the adequacy of the sampling of Eugene's schools which constitutes our superior and inferior groups of subjects. These questions, it seems to the writer, are irrelevant and immaterial. We believe our results stand, regardless of whether or not heredity or environment or both are to be assigned as final causes of the differences between the superior and inferior reader. We hold no brief for the adequacy of the Eugene School system; nor do we wish to defend the homes from which Eugene draws its school population. However, we do believe that our subjects fairly represent all sections of Eugene, a western city of 18,000 to 20,000 population. Our subjects were drawn from the Edison and Condon Grammar Schools, and the Theodore Roosevelt Junior High School, all located in the eastern portion of the city, in close proximity to the University of Oregon, and from the Francis Willard Grammar School and the Woodrow Wilson Junior High School, located on the western side of the city.—The Stanford Achievement and Unit Achievement Tests were applied chiefly in the junior high schools. That their administration and scoring may have flattered the schools and their pupils in question is a possibility. But we are not responsible for such a condition. We have merely copied the records as we found them on the school books. And already we have pointed out that there is a discrepancy between the ratings of the teachers of reading and what these tests revealed later.—Finally, we dare say, defective methodology of the teaching of reading, certainly in individual cases, may be responsible for inferiority in that subject. But it must not be forgotten that our superiors were drawn from the very same schools whence came the defectives. Moreover, the condition is certainly not confined to Eugene, Oregon, if we are to trust the findings of Fernald, in Los Angeles; the Reading Clinic, of the University of Iowa; Dearborn, of Harvard; Gates, of Columbia; Gray, of Chicago; Monroe, *et al.*

being defective in reading ability as many as 11 children (of 21 whose records are accessible) whose I.Q.'s exceeded 1.00, and that every one of the (31) superiors possessed an I.Q. in excess of 1.00. Hence, it is not unreasonable to suppose that the inferior means are heavily weighted by the educational-age ratings of these eleven somewhat high I.Q. pupils.—At all events, the two groups were sent to us as being the most contrasting groups in reading ability which the elementary schools could furnish without affording a large population of below-age I.Q. ratings. We shall examine now the letter-position scores[8] obtained from them.

IB, Letter-position Efficiency Contrasts between Superior and Inferior Child Readers. The contrasting results from superior and inferior

FIGURE IB—1

THE MEAN LETTER-POSITION SCORES OF SUPERIOR (—) AND INFERIOR (---) ELEMENTARY SCHOOL READERS



Abscissa = letter-positions, left to right;
Ordinate = mean letter-position scores, each in tenths of the maximum score (10)

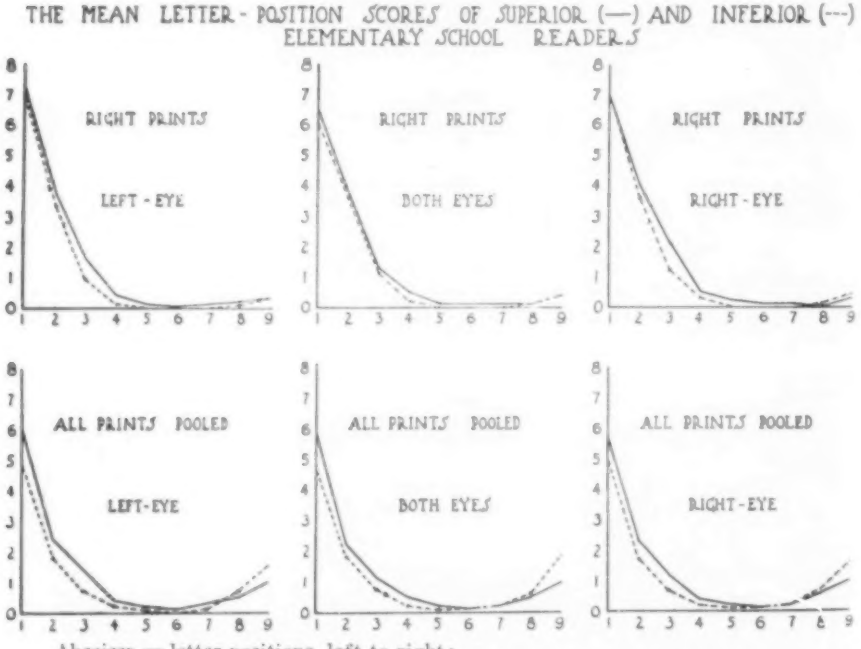
[8] Figures IB—1 and IB—2, it will be noted, show points in the curves for all positions, Nos. 1 to 9, inclusive. However, the scores for the middlemost positions (Nos. 3 to 7, inclusive), are very low, and approach zero. It is needless to run reliability coefficients or to compute significances of differences for these low scores; hence, Table IB, and the reliability coefficients presented below, lack items for letter-positions 3 through 7.—The corrected reliabilities of the letter-position ("range of attention") scores are as follows:

Positions:	1	2		8	9	*All positions pooled*
			LEFT-EYE (Left-Print)			
Superiors	.86	.45	.....	.91	.94	.82
Inferiors	.88	.73	.....	.94	.84	.85
			(Center-Print)			
Superiors	.94	.83	.....	.61	.64	.88
Inferiors	.86	.65	.....	.69	.88	.85
			(Right-Print)			
Superiors	.85	.86	.....	.36	.71	.94
Inferiors	.85	.88	.....	.25	.89	.88
			BOTH EYES (Left-Print)			
Superiors	.91	.45	.....	.69	.93	.89
Inferiors	.82	.84	.....	.76	.93	.91
			(Center-Print)			
Superiors	.95	.70	.....	.72	.69	.79
Inferiors	.82	.74	.....	.51	.88	.73
			(Right-Print)			
Superiors	.89	.80	.....	.28	.37	.84
Inferiors	.82	.86	.....	.25	.97	.91
			RIGHT-EYE (Left-Print)			
Superiors	.80	.20	.....	.74	.84	.77
Inferiors	.96	.79	.....	.88	.89	.84
			(Center-Print)			
Superiors	.87	.78	.....	.41	.84	.86
Inferiors	.86	.57	.....	.50	.75	.78
			(Right-Print)			
Superiors	.83	.29	.....	.53	.48	.97
Inferiors	.82	.82	.....	.08	.91	.90
			LEFT-EYE—ALL PRINTS POOLED			
Superiors	.95	.84	.....	.82	.92	.90
Inferiors	.94	.90	.....	.93	.92	.92
			BOTH EYES—ALL PRINTS POOLED			
Superiors	.70	.78	.....	.72	.95	.92
Inferiors	.90	.89	.....	.83	.92	.91
			RIGHT-EYE—ALL PRINTS POOLED			
Superiors	.89	.88	.....	.76	.89	.90
Inferiors	.94	.87	.....	.86	.94	.81

children are obvious from Table IB, and its supporting charts, Figures IB-1 and IB-2. Little description or emphasis is required to bring them out. The most striking result is the fact that, for right-field fixations (which we believe all too frequently characterize poor readers in general), good readers excel poor readers unmistakably, that is, for letter-positions Nos. 1 and 2. And, just as important, for letter-positions Nos. 8 and 9, the tables are turned,—the inferiors excel the superiors. The latter superiority of the poor readers occurs, moreover, in the face of the fact that for total-position scores (all positions pooled) the inferiors are outranked generally by the superior readers (see the 5th item, downward, in each section of Table IB.) The above two results occur regardless of what ocular condition prevails, and regardless of whether the presentation is made to the left eye alone, to the right eye alone, or to both eyes in binocular vision.

However, the above contrasting condition between the two groups of subjects is not so large or so obvious under conditions of central fixation

FIGURE IB—2



Abscissa = letter-positions, left to right;
Ordinate = mean letter-position scores, each in tenths of the maximum score (10)

or extreme left-field fixation. The differences between them are as large and more extensive as far as the left-field alone is concerned; but they are reduced in amount and scope greatly in the right-field. Nevertheless, it is still apparent that the inferiors tend to excel the superiors in letter-position No. 9. Again it matters little what is the ocular condition of presentation.

When the scores for all fixations (*prints*) have been pooled,[9] the above interesting fact is still obvious: good readers excel poor readers in the left-hand half or two-thirds of the visual field, while poor readers excel good readers in the 8th and 9th letter-positions (that is, in the extreme right visual field). The results suggest slightly that this condition prevails most greatly under binocular presentation (which is similar to that of everyday attempts to read),—next in order under left-eye, monocular, presentations,—and least under right-eye, monocular, presentations (results which tend to confirm both Crosland and Anderson, and Stromberg; see footnotes 2 and 3, references 2 and 1, respectively).

While all numerical differences (between group means) in Table IB do not possess such magnitudes as to guarantee certain significance in each case, still the fact remains that the differences are all in the same directions (of superiority of good readers in the left-field and of

[9] The criticism has been urged that this process of pooling the three prints (fixations) congregates, erroneously, items from diverse portions of the retina with respect to the *fovea centralis*. However, computation reveals that not more than three, of the nine, 18-point letters can fall during a fixation within the *fovea*. Hence, left-prints should focus letters Nos. 9, 8, and 7 within the *fovea*,—and scores for them should be the highest. Center-prints should focus Nos. 4, 5, and 6 within the *fovea*, with the resulting scores highest for these positions. And right-prints should focus positions 1, 2, and 3 within the *fovea*, with the highest scores occurring for them. Yet, nevertheless, practically all curves give highest scores for the left-hand letters (except for the differences incident to defectiveness). The high scores for left-hand-letter-positions, even for center-prints and left-prints, are susceptible to at least two interpretations: fixation did not fall where it was supposed to fall, or falling properly it did not prevent attention (or other factors of a perceptual, supplementation, type) from counterbalancing the influence of the greater acuity of the *fovea*. The writer prefers the latter interpretation. In support of it, he cites the fact that the *macula lutea*, which includes the *fovea*, is ample to accommodate all nine letters and more. Also it may be that each *macula* functions as a unit (is not divided into heterolaterally functioning halves). There is some opinion in the direction of holding that each *macula* has a bi-lateral set of connections with the occipital areas of the cerebral cortex. At all events, the curves obtained from the children do not reveal scores greatly augmented by focus upon the *fovea*; and the process of pooling diverse retinally disposed letters does not, as alleged, raise the scores for letter-positions 4, 5, and 6 to anywhere near the high values which the criticism would suggest.—The method of pooling adopted considers absolute letter-position of the printed matter. Frankly, we have not been interested in either the question of cerebral dominance nor of homolateral retinal-halves dominance.

TABLE I B

DIFFERENCES, IN MEAN SCORES, BETWEEN 31 *Superior* AND 34 *Inferior* ELEMENTARY SCHOOL READERS IN LETTER-POSITION SCORES; AND THE SIGNIFICANCE OF EACH DIFFERENCE (MAXIMUM MEAN SCORE = 10 FOR EACH POSITION, AND 90 FOR ALL POSITIONS POOLED)

LEFT-EYE

LEFT-PRINTS

Position	M_s — M_i	D	σ^2_s	σ^2_i	$\frac{D}{\sigma_d}$	Probability
1	3.8 — 2.2	+ 1.6	2.90	3.63	3.56	100
2	.5 — .3	+ .2	.19	.33	1.59	93
8	1.1 — 1.7	— .6	1.70	2.46	1.70	96
9	2.2 — 3.4	— 1.2	4.36	4.67	2.26	99
ALL NINE POSITIONS	8.7 — 8.4	+ .3	9.06	12.76	.37	64
		CENTER-PRINTS				
1	7.0 — 5.4	+ 1.6	4.73	5.01	2.91	99.8
2	3.1 — 1.7	+ 1.4	2.44	1.52	4.00	100
8	.4 — .4	0	.20	.34	0	50
9	.6 — 1.0	— .4	.61	1.43	1.60	94
ALL NINE POSITIONS	14.9 — 10.6	+ 4.3	21.32	17.66	3.91	100
		RIGHT-PRINTS				
1	7.3 — 6.9	+ .4	2.36	3.10	1.00	84
2	3.7 — 3.3	+ .4	3.25	2.98	.91	82
8	.2 — .1	+ .1	.05	.04	1.90	97
9	.3 — .3	0	.18	.70	0	50
ALL NINE POSITIONS	13.6 — 12.0	+ 1.6	14.15	13.52	1.72	96
		ALL PRINTS (By Means of the Three Styles of Print)				
1	6.0 — 4.8	+ 1.2	2.98	2.90	2.75	99.7
2	2.4 — 1.8	+ .6	1.05	1.17	2.31	98.9
8	.5 — .7	— .2	.27	.42	1.33	90
9	1.0 — 1.6	— .6	.76	1.11	2.50	99.4
ALL NINE POSITIONS	12.4 — 10.3	+ 2.1	8.96	6.45	3.00	100
Mean ALL NINE (Three Prints Pooled)						87

BOTH EYES

LEFT-PRINTS

Position	M_s — M_i	D	σ^2_s	σ^2_i	$\frac{D}{\sigma_d}$	Probability
1	4.0 — 2.2	+ 1.8	5.13	3.86	3.40	100
2	.6 — .5	+ .1	.36	.55	.60	73
8	1.0 — 1.4	— .4	.79	1.90	1.40	92
9	2.1 — 4.1	— 2.0	3.93	.74	5.13	100
ALL NINE POSITIONS	8.8 — 8.4	+ .4	9.70	9.25	.53	69
		CENTER-PRINTS				
1	6.9 — 5.7	+ 1.2	6.16	5.69	2.00	98
2	2.0 — 1.5	+ .5	1.25	.97	1.92	97
8	.3 — .3	0	.22	.20	0	50
9	.6 — 1.2	— .6	.77	2.28	2.00	98
ALL NINE POSITIONS	13.2 — 10.5	+ 2.7	12.07	12.10	3.10	100

TABLE I B—*Continued*

RIGHT-PRINTS

Position	M_s	M_i	D	σ^2_s	σ^2_i	$\frac{D}{\sigma_d}$	Probability
1	6.6	6.1	+ .5	3.24	3.29	1.11	86
2	3.8	3.5	+ .3	3.16	4.12	.64	73
8	.1	.1	0	.07	.09	0	50
9	.4	.4	0	1.60	.73	0	50
ALL NINE POSITIONS	13.0	11.6	+ 1.4	14.51	16.29	1.44	93

ALL PRINTS

(By Means of the Three Styles of Print)

1	5.9	4.7	+ 1.2	2.98	2.81	2.84	99.7
2	2.2	1.8	+ .4	1.21	1.89	1.30	90
8	.5	.6	— .1	.21	.32	.77	77
9	1.0	1.9	— .9	.86	.99	3.75	100
ALL NINE POSITIONS	11.7	10.2	+ 1.5	8.88	7.97	2.09	98
Mean ALL NINE (Three Prints Pooled)							87

RIGHT-EYE

LEFT-PRINTS

Position	M_s	M_i	D	σ^2_s	σ^2_i	$\frac{D}{\sigma_d}$	Probability
1	4.0	2.3	+ 1.7	3.55	2.44	3.95	100
2	.6	.3	+ .3	.08	.33	2.73	99.7
8	.9	1.5	— .6	1.17	1.82	2.00	98
9	1.8	3.4	— 1.6	3.53	4.83	3.14	100
ALL NINE POSITIONS	8.2	8.3	— .1	7.83	9.67	.14	56

CENTER-PRINTS

1	6.4	5.2	+ 1.2	4.85	4.28	2.26	98.6
2	2.2	1.2	+ 1.0	2.04	1.73	2.94	99.8
8	.4	.5	— .1	.37	.46	.62	73
9	.8	1.0	— .2	.61	1.78	.74	76
ALL NINE POSITIONS	12.3	9.7	+ 2.6	16.44	10.46	2.83	99.7

RIGHT-PRINTS

1	7.1	7.1	0	3.79	2.66	0	50
2	4.0	3.6	+ .4	4.30	2.58	.87	80
8	0	.1	— .1	.02	.07	1.90	97
9	.3	.4	— .1	.22	.51	.67	74
ALL NINE POSITIONS	14.4	12.7	+ 1.7	23.98	20.10	1.17	87

ALL PRINTS

(By Means of the Three Styles of Print)

1	5.8	4.9	+ .9	3.56	1.71	2.20	98.6
2	2.3	1.7	+ .6	1.04	1.11	2.31	98.9
8	.6	.7	— .1	.16	.33	.83	79
9	1.0	1.6	— .6	.61	1.17	2.61	99
ALL NINE POSITIONS	11.6	10.2	+ 1.4	9.24	9.48	1.84	96
Mean ALL NINE (Three Prints Pooled)							81

superiority of the poor readers in the right-field). This consistency, in the face of various fixations and various ocular presentations, compels one to regard the results as suggesting a set of real differences.

The above results arouse one's curiosity: why should defective readers differ so from superior readers? We believe the secret lies in any one, or in any combination, of three answers. First, left-eye dominance is possessed in heavy degree by the defectives, and in the face of it the necessary left-field fixations are difficult to effect in reading. Second, bad habits of eye-fixation, of successive re-fixations rightward, of skips of or omitted eye-fixations rightward, can account for and possibly do result in poor reading. Such habits can be the result of left-eye-dominance and can accrue also from other causes. And, third, eye-defects in early life can play roles in effecting both eye-dominance and bad habits of fixation and of successive rightward re-fixations. But it is impossible here and now to assay exhaustively all these proposals. We believe that the above results demonstrate the validity of the second proposition. Further than this it is impossible for the present investigation to proceed. It is not unwise, however, to investigate the presence of left-eye-dominance in our subjects in more detail. This can be accomplished by comparing the results obtained from the children with similar scores from college subjects who are known to be left-eyed and right-eyed, and by examining actual dominance-test results from the children themselves. No reference will be made to the question of handedness. Three motives underlie this omission: the college subjects were balanced as to hand-dominance, Crosland and Anderson (see item 4, footnote 2) had discovered handedness to be less important than eyedness, and most of the child subjects (regardless of eye-dominance) were right-handed.

IIA, The Children's Letter-Position Scores Compared with Similar Scores from Right-eyed and Left-Eyed College Student Subjects. If the reader will kindly refer back to Figures IB-1 and 2, and then compare their contents with those of Figures IIA-1, 2, 3, he will find a striking set of similarities. Figures IB-1 and 2 were obtained from superior and defective child readers, whose eye-dominances at the time were undetermined. Yet, nevertheless, right-eyed college students differ from left-eyed college students in manners very similar to the ways in which superior child readers differ from defective child readers: in each case, the right-eyed and the superior return higher left-field scores, and the left-eyed and the inferior return higher right-field scores.

College students, however, differ from the children in certain par-

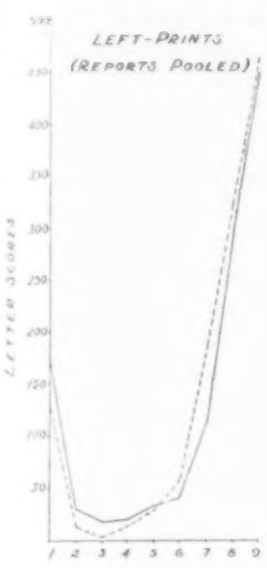


FIGURE IIA-1

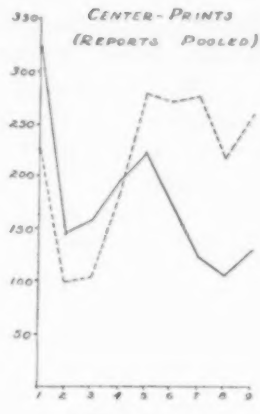


FIGURE IIA-2

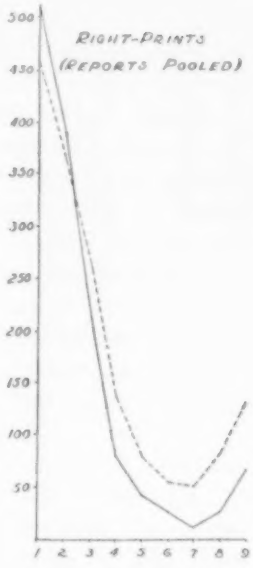


FIGURE IIA-3

Abscissa = letter-position, left to right
Ordinate = total letter-position scores
_____ = scores of 60 right-eyed college student subjects
..... = scores of 60 left-eyed college student subjects

ticulars. In general, the former returned far larger scores, particularly for the middlemost letter-positions. This is most evident for *center-print* materials. Here the left-eyed were enormously superior to the right-eyed for right-field letter-positions, while the superiority of the defectives over their rivals in this part of the visual field was much less. Again, for *right-print* materials (where the technique forced a fixation necessary for efficient reading), a dissimilarity is evident: in the right-field left-eyed subjects still excel the right-eyed by more than the defectives excel the superiors. And, finally, not only did all children, especially the defectives, give smaller scores than did the college subjects, but the contraction was of a sort to result in a higher concentration of correct reports by the children for the leftmost letter-positions (positions Nos. 1 and 2). The most notable exception to the latter result characterized *left-prints* or extreme right-field fixations. But even here the children's curves do not begin their leftward decline from such a high point (as in position nine), nor is the leftward declination so sharp and precipitous as for the college students.

The similarities and dissimilarities between figures from college and elementary school subjects should not be overemphasized without considering certain differences in experimental techniques and in personnel as between them. The college students' scores were higher even though the interval of exposure was for them only 1000 (1/10 sec.), while for the children it was 1250 (1/8 sec.). The chronological age of the college students approximated a mean age of 19 years; while the mean age of the children was eleven and one-half years. The college students had been selected wholly upon a basis of eye- and hand-dominance, and no reading scores or reading-test results were accumulated for them. The children were selected wholly upon a basis of reading (and intelligence) ability. The school teachers who selected them administered no tests of eye-dominance. After they had been selected, we ourselves tested them for eye-dominance. Moreover, it is reasonable to assume that a few of the defective children will never surmount their difficulties sufficiently to pass the hurdle of admission to college. The college students, on the other hand, had all surmounted college entrance requirements and, indeed, most of them had surmounted the extra requirements incident to completion of two or more years of college work. And, regardless of what may have been their past difficulties in reading, the left-eyed college subjects had had many years during which to overcome, or otherwise to adjust to, their difficulties by the time they had reached our experiment. Certainly the defective children had not had an equal amount of time nor equal opportunities for readjustments.

Considering the facts in the light of the above reservations, it would seem that the most conservative inference which one may draw is to the effect that defective reading, whatever may be its complete diagnosis or etiology, is associated with differential letter-position scores which greatly resemble those which accompany a condition known as left-eye dominance.

IIB, The Eye-Dominance Results of Our Tests as Applied to Superior and Inferior Child Readers. Crosland's and Anderson's tests of eye-dominance were applied to the 34 defective readers (Table IIB). These tests consisted of ascertaining: (1) which duplicate image, in the homonymous double-images test, was the clearer; (2) in which direction the remaining duplicate image moved when each eye alternately was screened off in the homonymous test; (3) which eye was most obvious to the tester in the manuscope test; (4) the loss or permanence of object, by screening alternately each eye, in the hole-fixation test; and (5) the result of screening when the subject had the eyes fixed for aligning two

TABLE IIB

Eye-Dominance Results from Elementary School Readers

34 Inferiors

Child No.	Homonymous Test	Eye-Covering (Homonymous)	Manuscope	Hole-Fixation	Aiming Test	GENERAL CLASSIFICATION
			(Crosland's and Anderson's Tests)			
1.	r	r	l	b,b,r r,r	r	amphiocular?
2.	l	l	b	r,r,r l,r	r	left-eyed
3.	r	r	r	r	r	right-eyed
4.			apparently not tested			
5.	r	r	r	r	r	right-eyed
6.	l	l	l	l	l	left-eyed
	l	l	l	l	l	
7.	r	r	r	l	r	right-eyed?
8.	l	l	l	l	l	left-eyed
9.	l	l	l	l	l	left-eyed
10.	l	l	l	l,l,l	l	left-eyed
11.	b	b	l	l,l,l l,l	r	left-eyed?
12.	l	l	l	l	l	left-eyed
13.	l	b	l	l	l	left-eyed?
14.	r	r	r	r	r	right-eyed
15.			apparently not tested			
16.	l	l	l	l	l	left-eyed
17.	r	r	r	r	r	right-eyed
18.	l	b	l	l	b	left-eyed
19.	l	b	r	b,b,b b,b	r	amphiocular?
20.	r	r	r	r	r	right-eyed
21.	l	l	l	l,l,l l,r	r	left-eyed
22.			Apparently not tested			
23.	l	l	l	l	l	left eyed
24.	r	r	r	r,r,r r,r	r	right-eyed
25.	l	b	l	l,l,l l,l	l	left-eyed
26.	r	r	r	r	r	right-eyed
	r	r	r	r	r	
27.	r	r	r	r	r	right-eyed
28.	b	l	l	l	l	left-eyed
29.	r	r	r	r	r	right-eyed
30.	l	l	l	l	l	left-eyed
31.	r	r	r	r	r	right-eyed
32.	r	r	r	r	r	right-eyed
33.	l	l	l	l,l,l l,l	r	left-eyed
34.	l	l	l	l	r	left-eyed

(Net N = 31)
Left-Eyed = 17, or 54.8%
Right-Eyed = 12, or 39%
Amphiocular = 2, or 6.4%
Not Right-Eyed = 19, or 61%

31 Superiors

Child No.	Manuscope (10 variants)	Hole-Fixation (10 variants)	Aiming (10 variants)	Sighting (10 variants)	GENERAL CLASSIFICATION
	(Crosland's and Buxton's Tests)				
1.	10r	10r	10r	10r	right-eyed
2.	10r	10r	10r	10r	right-eyed
3.	10r	10r	10r	9r,1l	right-eyed
4.	6r,4l	10l	10l	1r,9l	left-eyed?
5.	10l	10l	2r,8l	10l	left-eyed
6.	10r	10r	10r	10r	right-eyed
7.	10r	10r	10r	10r	right-eyed
8.	10l	10l	10l	10l	left-eyed
9.	10r	10r	10r	10r	right-eyed
10.	5l,5r	10r	10r	10r	right-eyed?
11.	10r	10r	10r	10r	right-eyed
12.	4l,6r	9l,1r	10r	5l,5r	amphiocular?
13.	5l,5r	10r	10r	10r	right-eyed?
14.	9l,1r	10l	10l	6l,4r	left-eyed?
15.	10r	10r	10r	10r	right-eyed
16.	10r	10r	10r	10r	right-eyed
17.	10r	10r	10r	10r	right-eyed
18.	10r	10r	10r	10r	right-eyed
19.	10r	10r	10r	10r	right-eyed
20.			withdrew before tested		
21.	6l,4r	10l	10r	10l	left-eyed?
22.	10l	10l	10l	10l	left-eyed
23.	10r	10r	10r	10r	right-eyed
24.	10r	10r	10r	10r	right-eyed
25.	6l,4r	10l	10l	7l,3r	left-eyed?
26.	10r	10r	10r	10r	right-eyed
27.	10l	10l	10l	10l	left-eyed
28.	8l,2r	1l,9r	10r	10r	right-eyed?
29.	10l	10l	10l	10l	left-eyed
30.	10r	10r	10r	8l,2r	amphiocular
31.	5l,5r	10r	10r	10r	right-eyed
32. (ext)	10r	2l,8r	10r	10r	right-eyed

(Net N = 31)
Right-Eyed = 20, or 64.5%
Left-Eyed = 9, or 29%
Amphiocular = 2, or 6.4%
Not Left-Eyed = 22, or 71%

objects in aiming. In several instances, five samples of the hole-fixation test were applied. While no check on reliability was obtained here, we believed that the tests revealed 54.8 percent of these subjects as being left-eyed, 39 percent right-eyed, and 6.4 percent as amphiocular or doubtful. More stringent tests were applied by Buxton to the 31 superior readers (Table IIB). The greater rigor consisted of obtaining ten samples, non-duplicating and somewhat dissimilar, under each of four tests (Buxton (see footnote 3, item 3) has shown that this method of measuring reliability gives very high coefficients of self-correlation or consistency). Under the latter system, a subject may score 40 left (—40); another may score 40 right (+40); and a third may score 20 left and 20 right (—20+20=0). The first would be classified as left-eyed; the second as right-eyed; and the third as amphiocular. So, it was determined that the superiors contained 64.5 percent right-eyed subjects, 29 percent left-eyed subjects, and 6.4 percent amphiocular subjects. It is clear that the proportions of left-eyed to right-eyed, in the two groups, are practically reversed (Stromberg and French have shown (see footnote 3, items 1 and 2, respectively) that this reversal is a significantly large one).

Again, as far as our tests have approximated an answer to the question, it seems evident that left-eyedness has some kinship with defective reading. That there are other factors of importance is suggested by the appreciable number of right-eyed subjects in the defective group and the number of left-eyed subjects in the superior group. And, it is fair to add, which is cause and which effect has not been determined.

SUMMARY

(1) Thirty-one superior and 34 inferior public school readers, of average chronological age of eleven and one-half years, were submitted to two series of tests: (a) Crosland's letter-position, "range of attention," tachistoscopic test; and (b) various tests of eye-dominance. In addition, for most of the children fairly complete public school records, including intelligence, Stanford Achievement, Unit Achievement, educational age, and reading ratings, have been obtained.

(2) The tachistoscopic tests reveal that the superior readers excel the defective readers in the left visual field. The inferior readers excel the superior children in the extreme right visual field. Generally, without regard to letter-position (that is, when the nine have been pooled), the superiors excel the inferiors. Hence, the right-field superiority of the defectives is all the more remarkable.

(3) The defective children return tachistoscopic results similar to those of left-eyed college students. The superior children present letter-position scores similar to those of right-eyed college students. The similarities apply to left-field superiority of the right-eyed and the superior subjects and to the right-field superiority of the left-eyed and the defective subjects.

(4) Tests of eye-dominance reveal a majority of defective children readers to be left-eyed and a larger majority of superior readers to be right-eyed.

(5) It is inferred that left-eye dominance has some kinship with defective reading, although it appears that there are other causative factors leading to poor skill in this important activity.

MANUSCRIPT SCHOOLBOOKS*

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AMONG the historical records of American education that have been preserved are those which may be designated manuscript schoolbooks. The most impressive and, in many respects, the most significant of these manuscripts are those that belong to the eighteenth and early nineteenth century. We have not yet seen any such books that can be placed, with certainty, in the seventeenth, although it is highly probable that there were such manuscripts in that century. As a general rule, they are the work of students, although occasionally, but rarely, they are the work of teachers.

Manuscript schoolbooks may be said to fall into four general classes: (a) those designed to serve the purpose of textbooks and which, we have reason to think, were frequently copies of printed texts, (b) exercise-books or note-books into which the student transcribed, in finished form, the solution of problems which he had worked out in the rough elsewhere, (c) student journals, in which we find, among other items, brief articles by students on questions of interest to them, and (d) the records of the proceedings of student societies. With the last two of these we do not propose to deal. It is worthy of note, however, that among the earliest examples of student journalism in America are the papers of the students of the William Penn Charter School in Philadelphia. These are to be found in the manuscript collection of The Historical Society of Pennsylvania. The earliest of them, "The Monthly Magazine and Literary Museum," appeared in August, 1774. It was followed by the "Public School Gazetteer" and the "Public School Intelligencer," in 1776, and by "The Students Gazette" and "The Weekly Intelligencer," in 1777. Among other things, these journals reveal the feelings of Quaker schoolboys regarding the political struggle of the time. They are also valuable for the glimpses they give us into student life in one of our colonial secondary schools.

Manuscript student journals and records of the proceedings of student societies are few in comparison with the manuscript textbooks and exercise-books which we have seen in many places in our Eastern states. The textbook type, as a general rule, belongs to the eighteenth and the

*An address read at a joint meeting of the American Historical Association and the American Bibliographical Society held in Philadelphia, December 30, 1937.

first quarter of the nineteenth century. It is of a finished character and has an air of completeness and permanence about it. The note-book or exercise-book type falls, as a rule, into the period after 1825 and it lacks the finished textbook character of the earlier manuscripts.

Many of these books have found their way into libraries and the manuscript collections of historical societies, but most of them, probably, are still hidden away in family archives, the archive being not uncommonly an old trunk of forbidding appearance which has long ago established a prescriptive right to its corner in the attic. The historical value of these old manuscripts is beyond question, and individuals, or groups, who will help to collect or preserve them will perform a valuable service. They deserve a place in the manuscript rooms of our historical libraries and in our libraries of education.

The manuscript textbook, as distinct from the note-book, appeared at a time when printed texts, in many fields, were few and, for many students, expensive, and at a time when a benevolent state was not yet ready to supply its youth with free schoolbooks. The scarcity and cost of printed texts were probably the most potent influences back of the appearance of the manuscript texts. Defects or inadequacies of printed works were not responsible for their appearance, as a comparison between the manuscript texts and the printed texts available at the time indicates. Most of the books deal with subjects of decidedly practical character. The utilitarian studies, then as now, made the strongest appeal to parents and youths of moderate means. For one Latin or French manuscript school book that has been preserved there are probably twenty manuscripts in such fields as commercial arithmetic and applied geometry. Why are the manuscript Latin grammars of the eighteenth century so few and manuscript texts in such subjects as navigation, surveying, mensuration, gauging, and commercial arithmetic so plentiful during the same period? Although it is probably true that there was a more adequate supply of printed texts in the field of Latin than in the mathematical fields, that fact does not explain the numerical preponderance of the manuscripts in the mathematical fields. It is a well established fact that many of our colonial secondary schools were of the Latin grammar variety. To such schools went, usually, the sons of our colonial aristocracy. While they had public support and encouragement in some of our colonies and denominational support and encouragement everywhere, they were not popular with a rapidly increasing middle class of small shopkeepers, small manufacturers, and fairly prosperous farmers. That the

supply of printed Latin texts was adequate and that the boys who attended Latin schools did not find the cost of the texts burdensome explain, probably in part, the comparative scarcity of manuscript Latin books. It is more likely, however, that the scarcity of the Latin and the numerical preponderance of the mathematical books is accounted for by the greater popular demand in the eighteenth and early nineteenth centuries for the studies of greatest practical worth in a rapidly developing industrial and commercial society. For one student who was interested in classical literature, in the eighteenth century, there were probably fifteen or twenty whose interests were of a more practical character. Our eighteenth-century cities were well supplied with private schoolmasters who taught, as a rule, the mathematical studies. The profit motive had much to do with that choice. That the proprietary master taught the subject for which there was the greatest popular demand is a reasonable assumption. It would not surprise me if many of the eighteenth-century manuscript schoolbooks were sometime in the future traced to schools of private masters. It seems entirely probable that, for students of moderate means and for whom the practical studies had the greatest attraction, the cost of printed texts was an urgent consideration. To this, as a reason for the appearance of the manuscript text, must be added the inadequacy of the supply of printed texts in the mathematical fields at a time of a rapidly increasing demand for such studies. The paper used in the manuscript books is of excellent quality, and the paper binding is still good even in those that are one hundred and fifty to two hundred years old. The student must have paid half the price of a printed text for the blank exercise book itself. If that be true, then the scarcity of printed texts was a more potent influence than cost back of the appearance of the manuscript books.

Neither scarcity of printed texts nor the question of cost, however, can be assumed to explain entirely the appearance of these books. Until a few generations ago, schoolmastering had its own exact and certain methods of procedure. In those good old days of social and educational certainties, schoolmasters knew what to teach and how to teach it, and every schoolboy knew that. That age of certainty in education has passed but it has left behind it evidence of its character. The democratic educational doctrine of interest had not yet replaced the autocratic doctrine of effort. The educational notion of development had not yet triumphed over that of discipline. In every field of subject matter there was a fixed and definite body of knowledge seldom interesting, if the master could help it,

and sometimes useless from a practical standpoint, which the student was expected to master. Nor, ideally, did schoolmasters then recognize degrees of mastery. There were just two degrees of attainment, mastery and non-mastery, and no self-respecting schoolmaster, who took pride in his art, would permit his student to stop anywhere short of what he deemed to be mastery. There were rules, an imposing array of them, to be memorized, if not to be understood. Then there were the applications of the rules in the solving of problems in which the student had to demonstrate his proficieney. The manuscript schoolbooks invariably follow the plan of first stating the rule, then the problem or problems, to which there is added the solution of one or more problems exactly according to the rule as stated. That was the arrangement customary also in the printed texts of the time. The rough work necessary in solving the problems was not performed on the pages of the manuscript book. It was performed elsewhere and the solution was transcribed into the book in finished form. This procedure, doubtless, some schoolmasters required. The neatness and accuracy which mark most of the books are an indication that some source of inspiration, other than the students' love of intellectual drudgery, existed and operated. That the master was one such source of inspiration is a reasonable assumption. Thus the cost of printed texts, their scarcity, the need of boys in after-school life for a permanent record of the established procedures in solving practical industrial and commercial problems, together with the educational demand at the time for careful mastery of the supposed essentials in fields of subject matter account, we believe, for the existence of nearly all such schoolbooks.

A few of the books that have come to our attention were compiled by schoolmasters themselves and were evidently used as a basis of their instruction. It is not improbable that some of the masters' books were compiled during their own student days and were made later the basis of their own teaching.

The earliest of the student manuscript texts and note-books that we have seen is dated 1718. The latest ones of which we have personal knowledge belong to the eighteen-fifties. Those that carry dates later than 1830 are frequently fragmentary in content and disorderly in arrangement. To attempt to adorn the tale by suggesting an explanation of the change might but distort the truth.

Witnesses to Utilitarianism.—The practical demands of a growing industrial and commercial civilization are reflected in these books. Utilitarianism is writ large over the pages of nearly all of them. Economic

needs demanded such an emphasis. Calvinism, Puritanism and sectarianism—religious counterparts of the Commercial Revolution—with their stress upon prosperity and worldly success had in all probability something to do with the bread-and-butter educational emphasis which nearly all of these books reveal. The books do not show their authors to have been preoccupied with the abstract principles of mathematics. The stress, in them, is laid, almost universally, upon the application of principles to the practical problems of life.

Subject-matter of the Books.—The subject-matter of the books is, as a rule, such as we deal with today in our secondary schools. It represents now, as it probably did then, work above the elementary and below the college level. Some university and college professors and students of the eighteenth and nineteenth century have left behind them their manuscript notes and lectures but we have chosen to eliminate these from the category of schoolbooks. In the library of the University of Pennsylvania there are, for instance, the manuscript lectures or transcripts of lectures of professors of the Academy and College of Philadelphia and the University of Pennsylvania. Arithmetic, geometry, trigonometry, navigation, surveying, bookkeeping, algebra, natural philosophy, moral philosophy, logic, metaphysics, rhetoric and Greek, with their subdivisions, are dealt with in these college manuscripts. It appears from these that the professor read his lectures slowly enough to make it possible for the student to keep rather full notes, or he may have lent his written lectures to students to be copied by them. Morison in his *Founding of Harvard* describes the practice of transcribing the lectures of professors there. That practice was common in universities from mediaeval times onwards. A comparison of the university and the secondary school manuscripts in similar fields would help us to evaluate the work in our higher institutions of the past. Eliminating the college and university manuscripts, the subject-matter of the books we are considering falls into the realm of secondary education. The arithmetic books might be said to be an exception to this rule, but an examination of them reveals that many of the problems which the students were required to solve demanded a mental maturity and an experience which we do not look for today in our elementary school pupils. As a rule, the arithmetic of the manuscripts is advanced commercial arithmetic. If we may be permitted to think for the moment of secondary education in terms of subject-matter of instruction rather than in terms of a stage of physical development reached by the student, as modern pedagogical thought would have it, we may write

down the great mass of the manuscript schoolbooks as belonging to the field of secondary education.

The subjects or phases of subjects dealt with in the manuscripts which we have examined in the Eastern states are Latin, French, arithmetic, geometry, trigonometry, mensuration, conic sections, fluxions, gauging, algebra, surveying, navigation, dialing, bookkeeping, penmanship, and English grammar and composition. The books in Latin, French, English, bookkeeping and penmanship are relatively few. The commercial arithmetic books lead in number and in size. After arithmetic, in the order of importance, as determined by the space given to the subjects, come geometry, trigonometry, mensuration, gauging, algebra, surveying and navigation. A more extended investigation might change that order. The eighteenth century was the period in which navigation was most popular. Dialing, or the process of determining the hour of the day by means of a dial, was an eighteenth-century study. Many private schoolmasters in the pre-Revolution days listed it, in their newspaper announcements, as one of the subjects they were prepared to teach.

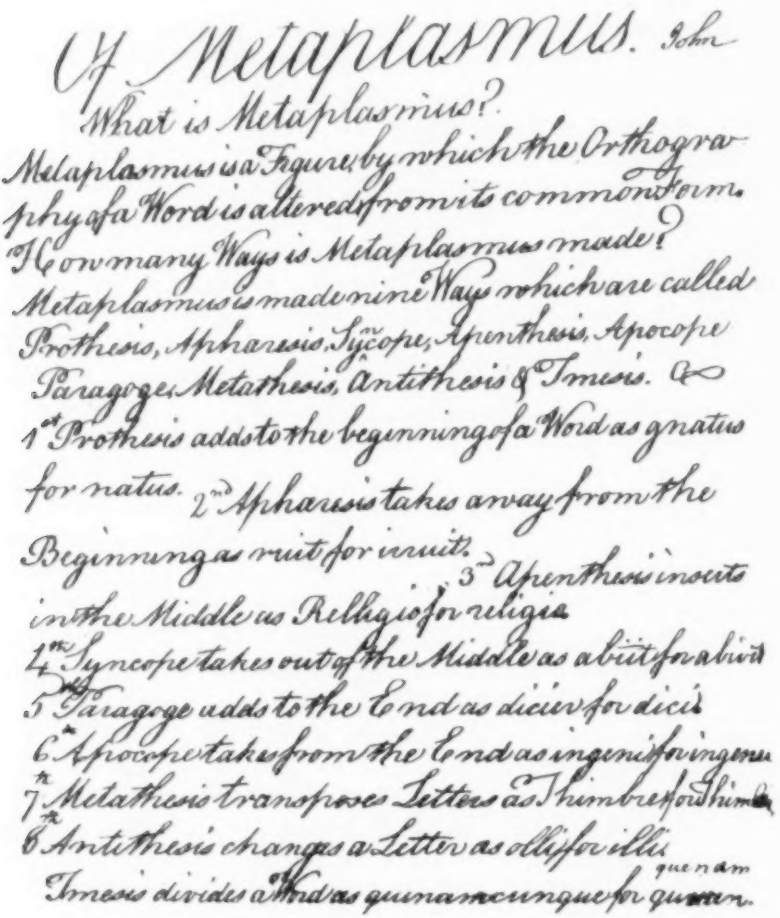
Manuscript Latin Books.—Among the oldest of the manuscript books are those in the field of Latin. In the Norris of Fairhill collection in the library of The Historical Society of Pennsylvania we have a manuscript Latin grammar which bears neither name nor date, and a book on Latin verse composition, dated 1729, which seems to have been the book of one Joe Brown although other names also appear on its pages. The nameless Latin grammar is evidently a copy of a seventeenth-century printed grammar. In its form and content it resembles very closely some of the printed grammars of that century. A careful search would probably lead to a discovery of the printed original. That its content was intended to be committed to memory appears from its catachetical arrangement. Thus we have, for example, the following questions and answers:

"Q. How many genders are there.
"A. Seven.
"Q. Say them.
"A. The Masculine, the Feminine, the Neuter, the Commune of two, the Commune of three, the Doubtful, and Epicene . . . ."

It is worthy of note that in one of the earliest Latin grammars published in Boston in the eighteenth century the number of genders of Latin nouns is given as three. Even Puritan democracy showed a concern for the simplification of instruction.

The catechetical arrangement is followed throughout our manuscript

grammar. It reveals no desire on the part of the teacher to sugar-coat instruction. Indeed, in those days pedagogues were wont to defend Latin as a school study on the ground of its tremendous difficulty. The school master of the democratic régime, with his big sympathetic heart and his love for common folk, was not yet at large. Latin grammar was, indeed, a strenuous exercise in colonial times and few youths had time or use for such a discipline.


Of Metaplasmus. John

What is Metaplasmus?

Metaplasmus is a Figure by which the Orthography of a Word is altered from its common form.

How many Ways is Metaplasmus made?

Metaplasmus is made nine Ways which are called Prothesis, Aphaeresis, Syncope, Epenthesis, Apocope Paragoge, Metathesis, Antithesis & Tmesis. &

1st Prothesis adds to the beginning of a Word as gnatus for natus. 2nd Aphaeresis takes away from the Beginning as nuit for innuit. 3d Epenthesis inserts in the Middle as Religios for religio 4th Syncope takes out of the Middle as abitt for abiit 5th Paragoge adds to the End as dicier for dici 6th Apocope takes from the End as ingeni for ingenu 7th Metathesis transposes Letters as Thimbre for Thimbr 8th Antithesis changes a Letter as olli for illi Tmesis divides a Word as quemcunque for quemcun. quenam

From a Colonial Latin Exercise Book of a Student in the William Penn Charter School, Now in the Collection of the Historical Society of Pennsylvania (Courtesy Historical Society of Pennsylvania)

Joe Brown's book on Latin verse begins with the subject of Metaplasmus which he defines as a "Figure by which the Orthography of a word is altered from its common form," a process which he says occurs in nine different ways, all of which he describes. Most of the book deals with the rules of prosody and the actual scanning of Latin verse. It closes with a description of the nineteen forms of verse which Horace is said to have used. Such books as Joe Brown's indicate that the spirit of Ciceronianism still pervaded our eighteenth-century Latin schools.

Arithmetic Books.—The earliest arithmetic book which we have seen is that of Samuel Powell which is in the library of The Library Company of Philadelphia. It bears the date 1718. In addition to arithmetic, other mathematical subjects have a place in Powell's book. The typical arithmetic book of the eighteenth and early nineteenth century is a complete manuscript text, in which arithmetical terms are defined, rules are stated, and problems are solved according to the rules. The most elaborate ones run the whole gamut of arithmetical operations: addition, subtraction, multiplication, division, square root, cube root, interest, discount, commission, brokerage, foreign exchange, practice, progression, troy weight, avoirdupois weight, apothecaries weight, long measure, land measure, cloth measure, liquid measure, dry measure, time, reduction, tare and trett, the single rule of three direct and inverse, the double rule of three, barter, profit and loss, fellowship, alligation, single and double position, fractions, *etc.* The operation to be performed is sometimes defined or described. Thus in Isaac Norris' arithmetic, of 1774, we read: Multiplication "Readily adds into one Sum called the Product, either of two Factors called the Multiplicand, as often as there be units in the other or Multiplier." We find in John Buffington's arithmetic (1762) the use of the catechetical approach to knowledge:

"Q. How many parts are there in the rule of three.
"A. Two. Single or simple and double or Compound.
"Q. What is the simple rule of three known by.
"A. By those terms which are always given in the question to find a fourth.
"Q. Are any of the terms given to be reduced from one denomination to another.
"A. If any of the given terms be of several denominations they must be reduced into the Denomination mentioned.
"Q. What do you observe concerning the first and third term.
"A. They must be of the same name and kind.

"Q. How is the third term known.

"A. It is known by these or like words: what cost how much how many."

While not all the books approach the subject through such preliminaries as these, nearly all of them state the rules governing the various arithmetical operations. In Isaac Norris' arithmetic (1774), for instance, we read the rule for multiplication: "Multiply the whole Multiplicand from right to left, by the Figure or Figures of the Multiplier in as many lines, each line to begin directly under its producing Figure; and to be added together." The practical application of these rules follows the statement of the rules. Apparently, the first step in the solution of an arithmetical problem was the memorization of the rule, the terminology of which must have been Greek to many boys. The rule for cube root sometimes covers two or three entire pages of a manuscript. This, as indeed many rules in the various subjects, was sometimes thrown into rhyme. The rule for cube root in Isaac Norris' arithmetic, of 1775, runs thus:

"First over Units place a point must stand
The like each third must have to either hand
Then draw an Arch as if you would divide
And place the first Cube Root on the right side
The Cube of which exactly must be set
Under first Cube that's in the Question Writ—
Then draw a line, and from the first withdraw
The Cube you've found, what rests write down below
To the right of which, next period Must stand
Which Numbers joined are called the resolvend
Then draw a line Directly underneath
Tripple Sqr of the Root, ith Quotient set beneath
In order, under the resolvend so
That units under hundreds directly go
Triple the root that's in the Quotient writ
Units against tens under the resolvend fit
Then Tripple Square and Tripple root also
Must added be Divisor for to Show
Let whole resolvend then (Save units place)
Be as a dividend in every Case
In Dividend, in Quotient set it down
Then draw another line and Multiply
The Triple Square Before Subscribed by

The Figure that's in Quotient last writ
The product under Tripple Square place it
The figure that was last set down ith Root,
Must Squared be and Multiplied to boot
By the Triple Root, that down before was Writ
The product under Tripple Root place it
The Figure Last in root must Cubed be
And writ under resolvend directly
Units against units, Tens in place of tens
Draw a right line under the Whole Work then
Add these three Numbers, total write below
Which total from the Resolvend truly Draw
And then proceed as you have done before
To bring down the next Cube, if you have more."

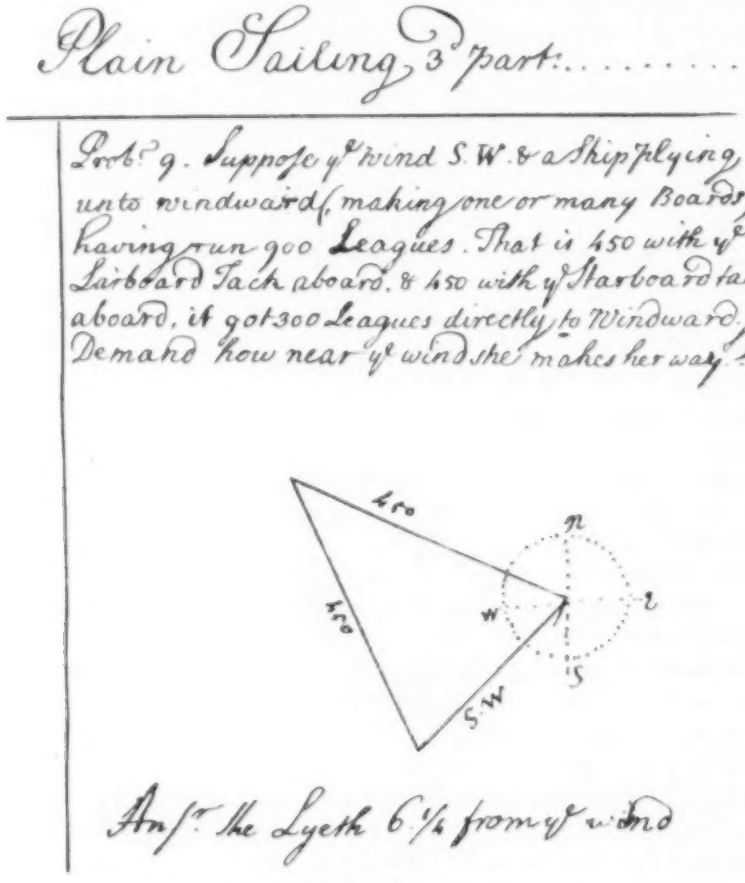
This imposing rule is followed by a simple and practical application, but we fear that the student began his study with the memorization of the rule rather than with its practical application.

Generally the problems dealt with were practical ones. For example, we have the problem in Humphrey Marshall's arithmetic: "It is required to mix several sorts of brandy at 36 cents, 60 cents and 84 cents per gal with water that the mixture may be worth 48 cents per gallon, how much of each sort must the mixture be of." Occasionally, but rarely, the problem is not very practical. For example: "How many barleycorns will reach round the globe of the earth, which is 360 degrees, and each degree 69½ miles." The answer to this question recorded by the student is 4,755,801,600.

Other Mathematical Books.—What we have said of the general character of the arithmetic books applies as well to the books in the fields of geometry, mensuration, trigonometry, gauging, surveying, navigation, *etc.* The emphasis is almost invariably placed upon the application of the subject matter to the practical demands of a society preoccupied with economic pursuits. Geometry, and its various subordinate studies, are applied to a wide variety of practical problems such as the construction of maps and the measurement of many kinds of objects. The idea that geometry ought to be studied for the purpose of mental discipline was, no doubt, widely prevalent in America, as elsewhere, but there is little evidence in the books that I have examined that it was a very influential factor in fixing the content of the mathematical studies in the schools of the eighteenth and early nineteenth century. There are books in which

the problems are quite abstract, and in which no attempt is made to point the practical implications of the study, but these are exceptional. The geometry of the books is applied geometry, and it is usually so designated. One wonders whether or not our eighteenth century students ever heard the name of Euclid.

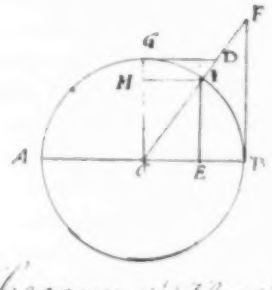
It is when one looks at the books as reflecting the methods of teaching then in use, rather than the content of studies, that the disciplinary character of the students' work appears. The arrangement of the ma-


Plain Sailing 3d part:.....
Prob. 9. Suppose ye Wind S.W. & a Ship flying
unto windward (making one or many Boards)
having run 900 Leagues. That is 450 with ye
Larboard Tack aboard. & 450 with ye Starboard tack
aboard. it got 300 Leagues directly to Windward.
Demand how near ye wind she makes her way.
450
450
N
W
E
S
S.W.
Ans. She Lyeth 6 1/4 from ye wind

FROM A COLONIAL SCHOOL BOOK IN THE NORRIS COLLECTION, HISTORICAL SOCIETY OF PENNSYLVANIA
(COURTESY HISTORICAL SOCIETY OF PENNSYLVANIA)

terial in the books is the usual one of stating the problem, citing the rule and performing operations according to the rule. The rule is usually clothed in a terminology which must have provided an excellent opportunity for intellectual gymnastics.

Of Trigonometry—



Definitions		Abbreviations
1 C Radius		R.
2 E Right-Sine		R.S.
3 M Co-sine		C.S.
4 B Versed Sine	Gibbs	V.S.
5 B Tangent	I D	T.
6 C Secant		Sec.
7 D Co-Tangent		C.T
8 D Co-secant		C.Sec

Theorem 1st The Triangles formed by the Radius, Sine & Co-Sine; & by the Radius, Tangent & Secant & lastly by the Radius, Co-Tangent & Co-Secant of the same Arc I B, are all similar & have their Sides proportionable. For

By Eu. 29. 1.	C I E, C F B, G C D all equiangular
Ergo by Eu. 4. 6.	∴ the Sides are proportional
That is 1	C I : I E :: C F : F B :: D C : C G
2	C E : I E :: C B : F B :: D G : C G
3	C I : C E :: C F : C B :: D C : D G
Hence by Sub. 1	R : S :: Sec : T :: Co-sec : R
2	C.S : S :: R : T :: Co-S : R
3	R : C.S :: S : R :: Co-Sc : C T

Corol 1st Hence the Radius is a mean proportional between the Sine & Co-secant. For

From 1st Proportion:	R : S :: C Sec : R
By Inversion	S : R :: R : C Sec. Q E D

FROM A COLONIAL SCHOOL BOOK IN THE NORRIS COLLECTION, HISTORICAL SOCIETY OF PENNSYLVANIA
(COURTESY HISTORICAL SOCIETY OF PENNSYLVANIA)

Almost invariably, the manuscript books contain work not in just one subject but in many subjects. The books are thus divided into separate sections, each section dealing with a separate subject such as plane geometry, mensuration, surveying, gauging, navigation, *etc.* Let us submit as an example one of the earlier books, that of Isaac Griffiths, of 1734. The first section of the manuscript is given to trigonometry. The second section contains rules and exercises bearing upon navigation, such as plain sailing, traverse sailing, Mercator's sailing, parallel sailing and middle latitude sailing. This is followed by a section dealing with a great variety of problems in gauging. The last section of the book is allotted to surveying. It was a book that Isaac could consult in his after-school days in connection with a variety of problems. In subject matter and arrangement it represents very well the general character of the manuscript mathematical books for the next hundred years. It is neat, written in a clear and legible hand, and was apparantly designed to serve all the purposes served by the mathematical textbooks of the time.

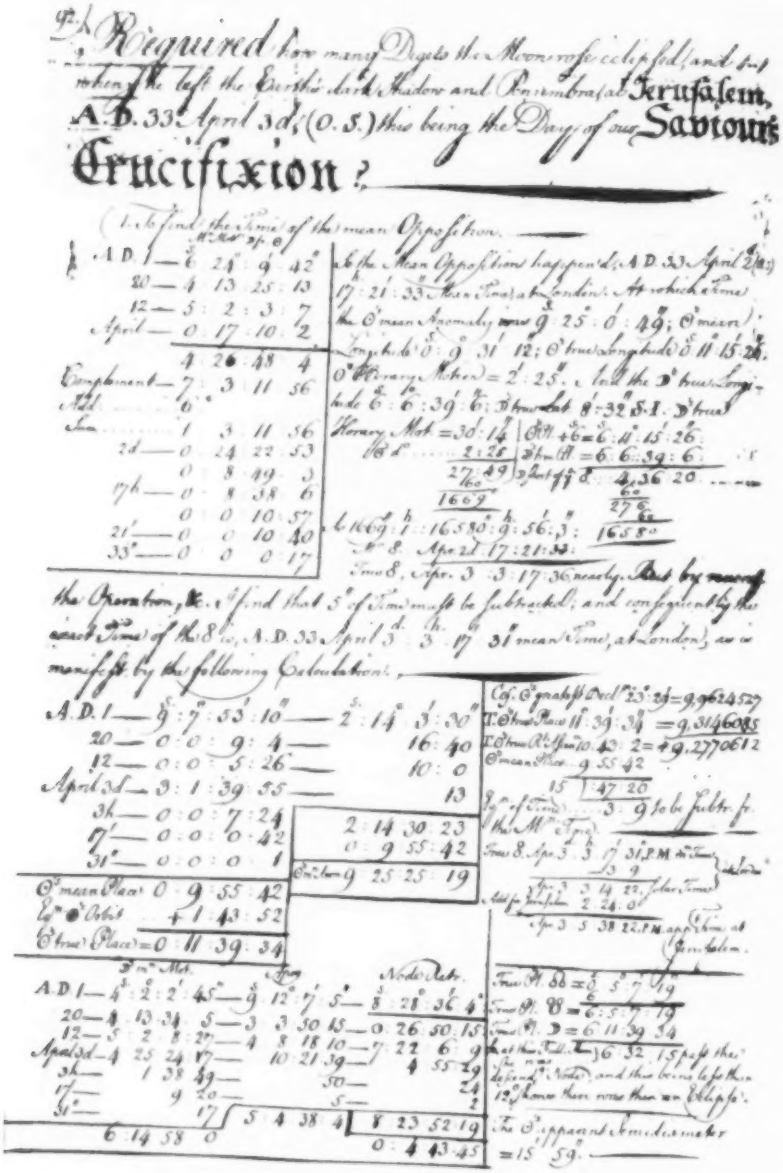
Are the Manuscripts Copies of Printed Texts?—The orderly textbook character of most of the mathematical manuscripts suggests that they are copies of printed works in the various fields. In some cases they are copies not of original books but of other copies of originals. Thus we find that the manuscript algebras of Andrew Porter and Robert Brooke, contemporary Philadelphians, are exactly alike. One of these may be a copy of the other, or both may have been copied from the same printed source. The manuscript Latin grammar to which we have referred earlier is, in all probability, a copy of some seventeenth century printed grammar. While doubt must remain, until a thorough study of the manuscripts is made, regarding the source of the material in many of them, we have definite knowledge regarding the origin of a few of the manuscripts.

In the Penniman Library of the University of Pennsylvania we have the manuscript of Jesse Green. Jesse was a schoolboy in the years 1829-1832. At the end of a section of one of his books he fortunately wrote, in big bold letters, "The End of all Mensuration & Guaging." Somebody, probably his teacher, ran his pen through the word "all" and wrote over it "Bonnycastle's." Thus corrected, it reads "The End of Bonnycastle's Mensuration & Guaging." A comparison of John Bonnycastle's *An Introduction to Mensuration and Practical Geometry,* published by Kimber and Sharpless in Philadelphia, in 1831, with Jesse's manuscript shows that Jesse made an almost exact copy of the 252 pages of Bonnycastle. The introductory material, in the form of definitions, with which Bonny-

castle began his chapters, Green did not copy. Certain details in the solution of the problems which appear in Bonnycastle were ignored by Green. With these exceptions, Green's manuscript is an exact copy of Bonnycastle's printed work. When we turn from Green's manuscript geometry to his manuscript arithmetic we find that it was a copy of a printed text. Again anxious to see the end of things, he wrote near the close of his manuscript "The End of Bennet's Assistant." We have not compared Green's manuscript with Bennett's *Arithmetic*, but is it reasonably certain that such a comparison will reveal that Green copied the printed text. Are we justified in concluding, on the basis of such limited evidence, that the manuscript schoolbooks of the textbook type were copied directly or indirectly from printed texts? The evidence that we now have does not warrant such a conclusion. When we add, however, to the direct evidence of copying, the circumstantial evidence of the textbook arrangement in many of the manuscripts, there is created a strong presumption that they were quite generally copies of printed works. An occasional ingenious schoolmaster, we have reason to feel, compiled his own manuscript text and may have permitted a student to copy it. That, however, would occur but rarely.

Why did the students copy the printed texts? The scarcity of printed texts, at a time when there was a great demand for them, was no doubt the chief reason. To this, we ought to add the consideration of the cost of printed works which some students must have found burdensome. Indeed, it has been within the memory of living teachers that the supply of textbooks began to approximate the demand.

Students' Exercise-Books.—As distinct from the manuscript book in textbook form, there are students' note-books or exercise-books. As we have indicated elsewhere, these books belong, as a general rule, to the nineteenth century. We have seen some that go back to the eighteenth century, but nearly all of those we have examined are nineteenth-century books, most of them belonging to the decades after 1820. By this time the supply of printed texts in the mathematical fields was probably approaching adequacy in our cities and in their vicinity. In areas farther removed from centers of textbook supply, the manuscript text was probably in use during a considerable part of the century. The manuscript books of students in rural areas have, in all likelihood, seldom found their way into our library collections. In the vicinity of our cities, however, the early nineteenth century witnessed the passing of the manuscript textbooks. We have, in their place, during the first half of the century, ex-


Required how many Digits the Moon was eclipsed and at
when she left the Earth's dark Shadow and Penumbra at Jerusalem,
A.D. 33 April 3d (O.S.) this being the Day of our Saviours
Crucifixion?

FROM JAMES BOONE'S *Book of Eclipses*, IN POSSESSION OF BERKS COUNTY HISTORICAL SOCIETY, READING, PA. (COURTESY BERKS COUNTY HISTORICAL SOCIETY)

ercise-books in a variety of subjects, such as French, bookkeeping, English grammar and composition, and penmanship. The mathematical manuscripts are no longer texts, and their number has greatly decreased. Of the eighteenth-century mathematical studies, surveying holds its place best. Among the subjects of the nineteenth-century manuscripts, bookkeeping seems to hold the first place in popularity. Some of the bookkeeping manuscripts, no doubt, were copies of texts. In the collection of The Historical Society of Pennsylvania, we have the manuscript of William Mahan, dated 1827, on the first page of which William wrote: "Book Keeping by single entry Extracted from the works of Charles Hutton, LLD FRS." Elsewhere in this book it appears that William attended the school of one Joseph Flowers for three months, boarding during that time at Joseph Buckman's inn, where he paid five cents for each meal. The books on bookkeeping show the students keeping day books and journals. The operations they performed were of a very rudimentary character.

The English manuscript books show students performing a variety of exercises. Thus Stephen P. Darlington, in his English composition book of 1850, performed exercises in alteration and in the use of homonyms. Among exercises in the use of homonyms are the following: "It was $\frac{\text{meet}}{\text{mete}}$ (sic) for him to go and meet the butcher for the purpose of obtaining some meat," and "Fain would he feign himself religious while in the fane." The exercises in alteration bear a striking similarity to some of our modern scientific tests. In Darlington's exercises, the words in a sentence were disarranged and, out of the jumble, he was required to rebuild the original sentence. For example: "Words few these in duties contained all are moral ours; By do done be would as you." The "alteration" reads: "In these few words are all our moral duties contained. Do as you would be done by." Similar exercises, as tests of intelligence, were among those of the Army Alpha test, and are among those performed in our schools today. Today they are supposed to be a measure of intelligence. What they measured in 1850 we do not know. Another mid-nineteenth century exercise was what Darlington called the "Expansion of ideas." The following, from his composition book, is an example of the exercise:

"My father sailed
My father sailed in a barque
My father sailed in a barque to England last spring

My father sailed in a barque to Greenwich in England last spring with a number of his friends from New York and saw the observatory."

There the inflation ended.

Allied to the study of English were the debates in which school boys engaged. Darlington has left a written record of his extemporaneous outpourings. One of them reads: "Mr. President and Fellow members the subject chosen for today is which affords the greater theme for eloquence Ancient or modern times, in my opinion Mr. President the ancient times afford the greater theme for eloquence, there is Rome, Carthage, Athens and all the great cities of the east. What were they in Ancient times, why they were scenes of great victories, battles of great deeds and acts of valor they were scenes of bloodshed and anarchy, the greatest men among the ancients were Cicero, Caesar and Alexander, there is Greece she is one of the greatest countries in the east it was there that Alexander fought and ruled, look at Rome at the time when she was invaded by....., there it was that the blood flowed through the streets and streams and caried (*sic*) the dead bodies and floated them along, but what are these places now why they are nothing more than any other cities hence I conclude that Ancient times afford the greater theme for eloquence."

The nineteenth century was one of declamation in the schools and the manuscripts throw some light on that practice as they do on so many other practices of our schools of the past.

Until now, little attention has been paid by anyone to these manuscript schoolbooks. No one has made a systematic study of them. That they are worthy of greater recognition than they have been accorded, particularly as sources of information regarding educational practices and conditions in the past, there is no doubt. In addition to the light they throw on the economic and intellectual conditions that gave rise to them, they are also highly instructive regarding prevailing conceptions of educational values and the methods of instruction used by teachers at any particular time. But this is not all. Here and there through the books some aspects of the students' spiritual world are revealed. Said James Miller in his Cyphering Book of 1771:

"When land is good it has a dale of Wood."

But the spirit of youthful arithmetician is capable of loftier flights, for he writes:

"When land is gone and money spent
Then learning is most excellent."

A List of Some Pennsylvania Manuscript Schoolbooks

The following is a list of Pennsylvania manuscripts of which the writer has personal knowledge. In it are included some college and university manuscripts. That it may be more useful to other investigators, the location of the manuscripts is indicated. The abbreviations H.S.P and U. of Pa. stand for the Historical Society of Pennsylvania and the University of Pennsylvania respectively. Where the author or date of a manuscript is not given, it has not been recorded on the original document, or it is very uncertain.

Afflick, Owen: Arithmetic, 1807-1809. [Penniman Library, U. of Pa.]
Algebra, geometry and mensuration book. [Gratz collection, H.S.P.]
Allen, James: Conic sections, *c.* 1770. [H.S.P.]
Arithmetic book, 1834-1835. [Berks County Hist. Soc., Reading.]
Arithmetic, geometry and trigonometry book. [Penniman Library, U. of Pa.]
Arithmetic and geometry book, in German [Penniman Library, U. of Pa.]
Bailey, Richard B.: Cyphering book, 1823. [H.S.P.]
Bailey, Robert: Arithmetic. [H.S.P.]
Blake, Joseph: Arithmetic, 1819. [H.S.P.]
Boone, James: Book of Eclipses, *c.* 1776-1780. [Berks County Hist. Soc., Reading.]
Boone, James, Jr.: Arithmetic, 1776. [Berks County Hist. Soc., Reading.]
Boone, James, Jr.: Algebra, geometry, astronomy, 1759. [Berks County Hist. Soc., Reading.]
Boone, Moses: Arithmetic, 1765-1767. [Berks County Hist. Soc., Reading.]
Boone, Moses and James: Algebra book, with some problems in arithmetic, geometry, and dialing, 1759-1760. [Berks County Hist. Soc., Reading.]
Borton, Susannah: Cyphering book, 1799. [H.S.P.]
Borton, Susannah: Arithmetic, 1802. [H.S.P.]
Bron, Jacob: Arithmetic, 1810. [Berks County Hist. Soc., Reading.]
Brooke, Robert: Arithmetic, 1783-1787. [H.S.P.]
Brooke, Robert: Geometry, trigonometry and surveying, 1792. [H.S.P.]
Brooke, Robert: Algebra and Fluxions. [H.S.P.]
Brooke, Robert: Trigonometry and astronomy, 1792. [H.S.P.]
Brooke, Robert: Spherical geometry, trigonometry and dialing, 1790. [H.S.P.]
Brown, Joe (?): Latin verse composition, 1729. [H.S.P.]
Buffington, John: Arithmetic, 1762. [H.S.P.]
Burd, Miss: French exercise book, 1804. [H.S.P.]
Busch, Henry E.: Descriptive geometry and perspective. [H.S.P.]
Clipper, The, 1859. [A Student journal. Wyoming Hist. and Geol. Soc., Wilkes-Barre.]

Coates, Benjamin H.: School Piece-book, 1808-1812. [H.S.P]
Coope, John: French Exercise book, 1804. [H.S.P.]
Cope, Rachel W.: Bookkeeping, 1817. [H.S.P.]
Darlington, Stephen P.: Penmanship, *c.* 1848. [H.S.P.]
Darlington, Stephen P.: Bookkeeping, 1849. [H.S.P.]
Darlington, Stephen P.: English composition book, 1850. [H.S.P.]
Darlington, Stephen P.: Debate book, *c.* 1850. [H.S.P.]
Davidson, W. T.: Notes of Charles Nesbit's lectures on logic. [Miss Ella Stewart, Bedford, Pa.]
Ewing, John: Mathematics, chiefly algebra and gunnery, *c.* 1785. [U. of Pa.]
Ewing, John: A Compend of Natural Philosophy, 1789. [U. of Pa.]
Furman, M.: Mensuration, 1829. [H.S.P.]
Geometry, with maps. [Cope collection, H.S.P.]
Glenn, Alvinia Bohlen: School Piece-book, 1840. [H.S.P.]
Green, Jesse: Arithmetic, *c.* 1826. [Penniman Library, U. of Pa.]
Green, Jesse: Arithmetic, *c.* 1829. [Penniman Library, U. of Pa.]
Green, Jesse: Practical geometry, 1831. [Penniman Library, U. of Pa.]
Green, Jesse: Mensuration, surveying and gauging, 1832. [Penniman Library, U. of Pa.]
Green, Jesse: Penmanship, 1834. [Penniman Library, U. of Pa.]
Green, William: Arithmetic, 1804. [Penniman Library, U. of Pa.]
Gregory, H. D.: Lectures on Greek Tragedy, 1844. [H.S.P.]
Griffith, Isaac: Trigonometry, navigation, gauging and surveying, 1734. [H.S.P.]
Harper, J. J.: Bookkeeping and navigation. [Chester Co. Hist. Soc.]
Hayes, Samuel: Navigation as Taught by Professor Robert Patterson, U. of Pa., *c.* 1789. [H.S.P.]
Hoffman, Norris, J.: Algebra, geometry and mensuration, 1833. [H.S.P.]
Hollingsworth, P.: Trigonometry, 1788. [H.S.P.]
Hoopes, Caroline: Mathematics, 1837. [Halliday R. Jackson, West Chester, Pa.]
Hoopes, Emily: Mensuration, 1843. [Halliday R. Jackson, West Chester, Pa.]
Hoopes, Grace: Arithmetic, 1719. [H.S.P.]
Hoopes, Thomas: Cyphering book, 1807. [Halliday R. Jackson, West Chester, Pa.]
Hoopes, Thomas: Gauging, 1811. [Halliday R. Jackson, West Chester, Pa.]
Hoopes, Thomas: Surveying, 1812. [Halliday R. Jackson, West Chester, Pa.]
Hoopman, Eliza: English composition and letter-writing, 1843. [H.S.P.]
Hoopman, Eliza: French exercise book, 1843. [H.S.P.]
Hunter, William: A Compound of Navigation, 1808. [H.S.P.]
Jones, Samuel: Notes of lectures by Francis Allison on natural and moral philosophy, political science and natural history, 1760. [U. of Pa.]

King, Joseph: Trigonometry, *c.* 1764. [H.S.P.]
Lamb, Andrew: New Rules for Finding Longitude, 1759. [H.S.P.]
Lancet, The, 1858 [A student journal. Wyoming Hist. and Geol. Soc., Wilkes-Barre.]
Latin Grammar. [H.S.P.]
Lectures on the Steam Engine. [H.S.P.]
Liter, Edward: Arithmetic, 1800. [H.S.P.]
Mahan, William: Bookkeeping, 1827. [H.S.P.]
Marshall, Humphrey: Arithmetic, *c.* 1818. [H.S.P.]
Marshall, Humphrey: Trigonometry, *c.* 1818. [H.S.P.]
Marshall, Humphrey: Conic Sections, *c.* 1820. [H.S.P.]
Marshall, Humphrey: Arithmetic, algebra, mensuration and conic sections, *c.* 1820. [H.S.P.]
Mathematical problems in German. [H.S.P.]
Meyer, Jacob B.: Arithmetic, 1852. [Bucks Co. Hist. Soc., Doylestown.]
Miller, James: Cyphering book, 1771. [H.S.P.]
Miller, Samuel: Notes of lectures by Samuel Magaw on logic and moral philosophy and of lectures by Robert Patterson on trigonometry and navigation, 1788. [U. of Pa.]
Miller, Samuel: Copy of Samuel Patterson's notes of lectures by Robert Patterson on algebra, trigonometry, conic sections, surveying, geometry and navigation, 1789. [U. of Pa.]
Miller, Samuel: Notes of lectures by John Ewing on natural philosophy, 1789. [U. of Pa.]
Milliman, Francis A.: Arithmetic, 1834. [H.S.P.]
Milliman, Francis A.: Arithmetic and bookkeeping, 1833. [H.S.P.]
Monthly Magazine and Literary Museum, 1774. [H.S.P.]
Morris, Elliston P.: Penmanship, 1847. [H.S.P.]
Morris, Elliston P.: Surveying, 1847. [H.S.P.]
Morris, Elliston P.: Derivation of English words, 1845. [H.S.P.]
Norris, Charles: Arithmetic, 1729. [H.S.P.]
Norris, Isaac: Arithmetic, 1774. [H.S.P.]
Norris, Isaac: Arithmetic and geometry, 1775. [H.S.P.]
Osborne, Catherine: Arithmetic, 1839. [H.S.P.]
Osmond, Daniel: Arithmetic, *c.* 1810. [H.S.P.]
Penrose, Washington H.: Arithmetic, *c.* 1825. [H.S.P.]
Penrose, Washington H.: Arithmetic, 1828. [H.S.P.]
Pickersgill, Henry: Arithmetic, 1797. [Penniman Library, U. of Pa.]
Porter, Andrew: Arithmetic, practical geometry, mensuration and gauging, 1792. [H.S.P.]
Porter, Andrew: Algebra and surveying, 1792. [H.S.P.]
Powell, Samuel: A Compend of Logic, 1756. [U. of Pa.]
Powell, Samuel: Arithmetic, bookkeeping, 1718. [Library Company of Philadelphia.]
Pratt, Edwin: Autograph book [Chester Co. Hist. Soc.]
Public School Gazetteer, The, 1776. [H.S.P.]
Public School Intelligencer, 1776. [H.S.P.]

Rhoads, Daniel: Cyphering book, 1811. [Berks Co. Hist. Soc., Reading.]
Rhoads, Daniel L.: Surveying, 1854. [Berks Co. Hist. Soc., Reading.]
Richards, Isaac A.: Mensuration and practical geometry, *c.* 1810. [H.S.P.]
Schaffer, Charles F.: "Compendium of Natural Philosophy" based on lectures of Professor Robert M. Patterson, 1827. [H.S.P.]
Sherwood, Isaac: Bookkeeping, *c.* 1821. [H.S.P.]
Shippen, William: Latin exercise book, 1774. [Library of Congress.]
Smith, Thomas: Geometry and perspective, 1792. [H.S.P.]
Students Gazette, The, 1777. [H.S.P.]
Weekly Intelligencer, The, 1777. [H.S.P.]
Wood, Isaac: Bookkeeping, 1804. [H.S.P.]
Worrell, Isaac: Arithmetic, 1749. [H.S.P.]
Yeates, Jasper: A Compendious System of Algebra collected from the most approved writers, 1760. [U. of Pa.]
Yeates, Jasper: Transcript of lectures by William Smith on arithmetic, algebra, geometry, trigonometry and Italian bookkeeping, 1760. [U. of Pa.]
Yeates, Jasper: A Compend of Ethics, 1760. [U. of Pa.]
Yeates, Jasper: Transcript of lectures on rhetoric, 1760. [U. of Pa.]
Yeates, Jasper: Transcript of lectures on logic, 1760. [U. of Pa.]
Yeates, Jasper: Transcript of lectures on metaphysics, 1759-1760 [U. of Pa.]
Yeates, Jasper: Transcript of lectures on logic, based on Isaac Watts "Art of Logic," 1759. [U. of Pa.]
Yeates, Jasper: Notes on Homer's Iliad, 1759. [U. of Pa.]
Yeates, John, Jr.: Notes of a course in arithmetic, geometry, trigonometry, navigation and bookkeeping given by Theophilus Grew at the Academy of Philadelphia in 1753. [U. of Pa.]
Yeates, John: Logic and metaphysics. [U. of Pa.]
Yeates, John: Moral philosophy. [U. of Pa.]

THE MATURITY FACTOR IN THE GRADE PLACEMENT OF CERTAIN PUNCTUATION SKILLS IN BIBLIOGRAPHY FORM

NORMA GILLETT
University of Nebraska

AMONG factors influencing grade placement in curriculum construction, maturity is receiving greater recognition than ever before in educational history. By maturity, we mean that stage in a child's development when learning of specific knowledges or skills takes place with a minimum amount of instruction and drill because the child is ready, as an integrated biological and intellectual organism, to learn.

Evidence of physiological or physical maturity or ripeness have been established without a doubt. Nor would anyone question that in the intellectual field as well, certain degrees of mental maturity are necessary to the mastery of specific skills.

Epochal among the researches carried on in this field are those in reading, spelling, and arithmetic. What, for example, has done more to mitigate the discouragement of both pupil and teacher than the discovery that a mental age of at least six years is probably essential before a child can successfully be taught to read? If it is a waste of time to try to teach reading to a mental five-year old, the curriculum can be revised so that the child may have other worthwhile preparatory activities which will help him to establish a favorable attitude toward reading when he is ready to get meaning from the printed page. The child whose reading instruction is delayed until he is psychologically and mentally ready to read does not form a permanent distaste for reading, because he has not been forced to read before he is mature enough to do so. The child can succeed when he first begins reading, and much has been accomplished as far as attitude is concerned. Time has actually been saved, since the child who is ready to read learns much more quickly than the child who is not mature enough to get the maximum benefit from instruction. The first research carried on by Washburne has been supplemented by other investigations concerning specific reading skills, until at the present time it is possible to predict with some degree of certainty at just what levels certain reading skills can be most effectively taught.

Spelling, as a measurable field of investigation, has been rather thoroughly explored to discover at what age level children can most economically learn to spell specific words.

The work of the Committee of Seven in arithmetic made a fundamental and outstanding contribution to the problem of grade placement by establishing at least tentatively the mental age level at which specific arithmetic skills can most profitably be taught so as to insure a maximum degree of mastery with a minimum of instructional difficulty. The influence of the committee's report is evident in the construction of many of the newer arithmetic texts.

The task of establishing the degree of maturity necessary for the mastery of language skills is complicated by several factors. In the first place, the child's oral language has been used, from the time he first learns to speak, as a means of communication. Oral speech is often effective as a means of communication even when it is not conventionally expressed. If a child says, "Gimme that there pencil" or "I ain't got no pencil" his communication is in some ways as effective as if he had spoken conventionally and correctly. The problem of discovering at what stage language must be correct to be effective is indeed a puzzling one. It is highly possible that some individuals never reach a level of maturity which demands that they speak correctly, since their unconventional communication gets desired results for them at any age. In oral language, it is extremely difficult to establish an age at which certain specific skills, such as the use of the complete sentence, can be most effectively taught; since the teacher's problem is mainly a question of remedial, rather than initial teaching, because the child is accustomed to using wrong forms before he ever has an opportunity to learn, recognize, and use correct forms.

Technically, few elementary school children have such a need for written language that they could not get along fairly well as children (although not, perhaps, as *school* children) if they did not know how to write their communications. Expression is an instinctive performance; writing is necessarily an acquired and artificial one. The factor of need for the ability to write correctly in written communication is, for the child, a negligible one. It is easier, therefore, to test the effectiveness of learning in written composition skills than it is in oral composition or language. The maturity factor can more readily be isolated in an investigation of a skill where the immediate need for the skill does not precipitate learning. To the builder of a curriculum based on the child's maturity and readiness to learn certain skills economically, written language presents an almost unexplored field.

The emphasis on language curricula in recent years, has been, ad-

mirably enough, the construction of a functional, life need, course of study. Recent textbooks in language bear splendid evidence of the untiring efforts of educators to present for instruction those materials for which the child has a definite, obvious need. Compared to the amount of research on economical learning which has been carried on in other fields, however, little has been done to discover at what age level certain skills can most easily be mastered.

In an attempt to determine whether factors of maturity operate in the learning of certain written language skills, as they do in arithmetic and spelling abilities, this piece of research was set up. It was carried on in coöperation with the Lincoln Public Schools, through the professional courtesy of Mr. M. C. Lefler, Supt. of Schools, Mr. T. V. Goodrich, Director of Research, and Merle Beattie, Director of Elementary Education.

The skills chosen for test items are two minor ones connected with the correct writing of bibliography form, namely: (1) The use of quotation marks to set off the name of a poem or short story in a book or magazine, and (2) The use of underlining to set off the title of a book or magazine. The choice of these two little-used items was intentional. They are skills for which the child may easily have little or no immediate need, and for which it would be rather difficult to establish the motive of future use. Factors of interest, especially that of intrinsic interest in the subject matter, will operate to a smaller extent than they might in the mastery of a less technical, mechanical skill. For these reasons it is thought that one might say with reasonable assurance, that the factor of readiness, or pupil maturity, would operate as a more important factor in learning than in a situation where the factors of pupil need or interest were paramount. It was also assumed that little learning had already taken place on these skills. The average raw score on the pretest was only *1.68*, or 1.68 items correct out of a possible 15. These low scores proved the correctness of this assumption.

PROCEDURE

Three parallel proof-reading tests were prepared, each containing the following opportunities for practice on skills being tested:

5 simple sentences involving the use of quotation marks.

5 simple sentences involving the use of underlining.

5 simple sentences involving the use of both quotes and underlining.

The use of the items was identical in the three tests. A sample of the test follows:

Proof-Reading Test

Directions: Study the following sentences carefully. Correct the sentences, using all the capital letters, quotation marks, and underlining needed to make the sentences right.

A.

1. Stevenson is the author of the poem my shadow.
2. the circus is a poem about a game.
3. mother huldah is a fairy tale in a book of stories.
4. night game is a good football story in a boy's magazine.
5. One of Olive Miller's poems is called chinese lanterns.

B.

1. liberty is a five cent magazine.
2. the blue fairy book was written by Lang.
3. black beauty is a story about a horse.
4. you will enjoy reading rainbow gold, a book of poems.
5. Do you ever look at the saturday evening post?

C.

1. boy's life for October has a good airplane story called flight quarters.
2. the fairy flute is a poem in the book poems of today.
3. the ladies home journal contained a story called peter's birthday.
4. One of the poems in the golden flute is the duck.
5. In twilight fairy tales you will find the story called the three swans.

The pre-test was given January 4, 1937, the mastery test January 19, 1937, and the delayed recall test February 16, 1937.

Eight teachers in the fifth and sixth grades of Lincoln Public Schools coöperated in the experiment. The records of a hundred fifty-three children for whom records of mental ages, as well as test scores on all three tests were available, were used in the final computations.

During the two week instructional period, the eight coöperating teachers taught these skills as they saw fit. A list of suggestions for instruction was forwarded to each teacher, but she was not asked to use any particular method of instruction. The only stipulation was that

the amount of time spent in drill should not exceed fifty minutes per week. No direct instruction was carried on during the month following the mastery test, and the delayed recall test; and no effort was made to review the skills learned. Incidental situations were dealt with without further drill.

The tabulated data in Table I lend themselves to the formulation of several tentative conclusions.

TABLE I

SCORES MADE OF EACH OF THREE TESTS BY 153 CHILDREN

	Poem	Book	Mag.	Story in Book	Story in Mag.	Poem and Book	Story and Book	Story and Mag.	Total	Cap.
No. of Items each test	3	3	2	1	1	2	1	2	15	20
Total possible correct	459	459	306	153	153	306	153	306	2295	3060
					A					
Items	168	0	0	46	43	0	0	0	257	1744
Ave. correct	1.1	0	0	.3	.28	0	0	0	1.68	11.4
Percent of possible	.38	0	0	.3	.28	0	0	0	.11	.57
					B					
Items	384	389	286	117	110	180	110	162	1738	2517
Ave. correct	2.5	2.5	1.87	.76	.72	1.2	.72	1.1	11.37	16.4
Percent of possible	.84	.85	.93	.76	.72	.6	.72	.55	.76	.82
					C					
Items	427	362	284	136	133	230	133	244	1949	2532
Ave. correct	2.8	2.3	1.8	.89	.87	1.5	.87	1.6	12.73	16.5
Percent of possible	.93	.79	.92	.89	.87	.76	.87	.8	.85	.83
					D					
Items	43	−27	−2	19	23	50	23	82	211	15
Ave. correct	.3	−.2	neg.	.13	.15	.32	.15	.5	.9	.1
Percent of possible	.57	.54	neg.	.53	.53	.39	.53	.57	.37	neg.
					E					
Items	259	362	284	90	90	230	133	244	1692	788
Ave. correct	1.7	2.3	1.8	.59	.59	1.5	.87	1.6	11.05	16.05
Percent of possible	.57	.79	.92	.59	.59	.76	.87	.8	.74	.83

A—Data on Pre-test
B—Data on Final Test
C—Data on Delayed Recall Test
D—Data on learning between Final and Delayed Recall Tests
E—Final data on learning—difference between Pre-test and Delayed Recall Test

The chart presents data on each of the items on the three parallel tests. D and E present comparative figures, and are the basis for the conclusions drawn.

1. The amount of knowledge possessed by children taking the pre-test was slight. The average score was 1.68 of a possible 15. 84 children made initial scores of 0.

2. The items of knowledge most commonly possessed were:
   a. The use of quotation marks to inclose the title of a poem (168 of a possible 459)
   b. The use of quotation marks to inclose the title of a story in a book (46 of 153) or in a magazine (43 of 153)

3. The use of underlining as a bibliography skill was entirely unknown. No child scored on this item.

4. A two weeks' instructional period proved effective in teaching all bibliography skills included in the pre-test. The average score on the final test was 11.37 items, as compared with the initial average of 1.68.

5. The instruction in bibliography skills provided an opportunity for the review of the use of capital letters in titles. There were 20 titles in the test. The average gain was from 11.4 of a possible 20 to 16.4.

6. Little forgetting took place during the month following the second test. A slight average gain (.9 item) indicates probably that the amount of drill previously given was sufficient to fix these knowledges of bibliography form rather permanently. A slight average gain (.5 item) was also made in capitalization.

7. Least gain was made on the following items:
   a. Underlining the title of a book
   b. Use of quotation marks to inclose the title of a poem in a sentence in which pupils were also to underline the name of the book in which the poem was found
   c. Use of quotation marks to inclose the title of a story and underlining the name of the magazine in which the story was found.

An analysis of individual causes for error indicated that a single mistake—the omission of an initial *The* in a title—was responsible for 80 percent of the errors. This does not, however, indicate a failure to grasp the principle of punctuation involved in bibliography form.

8. Correlation of mental age and positive achievement was low (.564), as was the correlation between mental age and percentage of improvement (.54). These low correlations were due to the number of high

scores made by pupils in the lower mental age groups. The median mental age group at which perfect scores were made was 145-152 months. Perfect scores were made, however, by some children in the mental age group of 113-120 months, and in each succeeding mental age grouping. Table II shows the distribution of perfect scores (15 items correct) and high scores (14 items correct).

TABLE II

NUMBER OF PUPILS MAKING PERFECT OR HIGH SCORES ON DELAYED RECALL TEST

Mental Age (Months)	97 to 104	105 to 112	113 to 120	121 to 128	129 to 136	137 to 144	145 to 152	153 to 160	161 to 168	169 to 176	177 to 184	185 to 192	193 to 200	201 to 208	Total
Perfect scores	0	0	2	1	11	4	12	13	3	7	8	1	0	1	63
High (14)	0	0	0	0	1	5	6	13	2	1	4	1	0	0	33

9. The final implication for teaching is that these skills can be mastered by children who approximate in mental age that of children in the second semester of fifth grade. They could certainly be included in a course of study for the first semester of sixth grade, with the assurance that children of this grade could probably master them easily, and with little expenditure of time. Tentative results would indicate that the maintenance load would not be excessive, once the skills were taught.

10. It would seem that the factor of maturity and readiness operates in determining the mental age level at which children can easily attack and learn the punctuation skills in bibliography form which were covered by this investigation.

EDITORIALS

THE NEED OF PREVENTIVE TESTING

Numerous books have been written about mental, achievement, diagnostic, and prognostic testing. These tests enable us to describe in fairly accurate terms various characteristics of the individual, his progress at any level of the school in the mastery of subject-matter, and the points at which his growth has not been satisfactory. Prognostic tests enable us to predict with some assurance his probable success in some line of endeavor or special field of subject-matter, for example, algebra and Latin. The contributions of these precise methods of appraisal to educational practice have been very significant.

In recent years there has been a development in the field of what has been called "readiness testing." Readiness tests have been devised to determine "readiness" of pupils to *begin* the study of reading and arithmetic in the primary grades. These tests contain items dealing with a fairly wide variety of elements that are regarded as basic rudiments essential to success in the first stage of work in these areas. It seems evident from an analysis of these tests that both reading and arithmetic are regarded as general abilities rather than as a number of different skills, abilities, and attitudes, even interests. Gray recently pointed out that those constructing reading readiness tests should inquire, "Ready to read what?" and "Ready to read how?" Reading should be regarded not as a general ability attained through so-called "natural processes of growth," but as a variety of elements complex in nature all of which develop as the learner progresses through a number of stages of reading development extending from the kindergarten through the junior high school. It may be assumed that for each stage it should be possible to identify quite definitely the basic skills, abilities, interests, and attitudes involved. It should then be possible to construct tests to determine when a pupil who is passing through one stage of development is prepared (ready) to undertake the tasks at the next level. A similar program could be developed for arithmetic, probably more easily than for reading.

Such a series of "readiness tests" for the various stages of reading or for the various processes in arithmetic would be of great value in pacing

the instructional program to the developmental level of the pupils. Teachers would be less likely than at present to plunge pupils into the study of tasks for which they are not ready. Such a program of *preventive testing* would be an invaluable supplement to the excellent diagnostic tests that are now available. These tests would be used to locate difficulties that are likely to be encountered by pupils who according to the best evidence at hand appear to be ready to undertake the work at the next stage but for some reason do not make satisfactory progress. Such a use of diagnostic tests would be vastly superior to the present plan of using them to discover weaknesses of pupils who under existing conditions often undertake with disastrous results tasks for which in a real sense they may be completely unready. This new approach would tend to shift our emphasis from an unguided presentation followed almost inevitably by diagnostic and remedial teaching to sound first steps in teaching guided by well constructed preventive testing procedures.

LEO J. BRUECKNER

THE OVER-CROWDED CURRICULUM

IN recent years many new demands have been made upon the schools. In the elementary schools the time devoted to the three R's has been sharply reduced to provide time for meeting these demands. In the junior high schools general courses in English, mathematics, science, and the social studies have enabled the schools to meet the new demands without materially expanding the program of studies. In the senior high schools a profusion of new electives vie with each other for their respective shares of the time of the students.

Today another whole series of new demands is confronting the school. Health education, education for leisure time, vocational education, homemaking education, consumer education, and education for life in our democratic society require that provision be made in the school. Here and there the boys and girls and their parents are being consulted in the attempt to determine what they expect from the schools. Numerous investigations, occasionally financed in liberal fashion by the "foundations," reveal the inadequacies of the schools with respect to these new responsibilities.

The failure of the educational machinery to turn out a product that can meet the demands of modern industry has led to the development of vast schemes for vocational education financed in part by federal funds. Now we learn that sixty-five percent of all employed persons need no

vocational preparation prior to entrance to the job, and another twenty-five percent need only a few days or at most a few months of special preparation for their jobs. It appears, therefore, that the high school may devote itself to so-called general education. The ten percent who need special preparation extending over a year or more will be provided for better in apprenticeships, or in technical and professional schools of collegiate or graduate level.

In the meantime what is happening to the pupils and their teachers in the elementary and secondary schools? They are working under tremendous pressure. The modern testing program is more and more effective in compelling teachers to prepare for examinations. State-wide scholarship contests, national norms, independent school percentiles, grade placements, and all the refinements of our modern departments of research conspire to intimidate the venturesome soul who would strive to guide the boys and girls in significant experiences for which no standard tests have been developed.

The body of factual knowledge which must be mastered by the pupil is overwhelming. The teacher of mathematics must drill for mastery of the skills of computation and "problem solving" though he may never find time to guide the pupils in using the mathematical mode of thought. The teacher of science must teach a mass of information and oversee the deadly task of writing up experiments in the required notebook style though he may never lead the pupils to use the scientific mode of thought. The teacher of history must cover the catalogue of names, dates, events, and dynasties though his pupils may never learn to use the historical mode of thought. The teacher of art must teach the verbal symbols useful in art appreciation and the whole dreary list of facts about the author or composer though he may find no time for his pupils to experience the unique act of creation in his studio or workshop.

Have we reached the breaking point? Must we face the fact that we have worshiped content for its own sake. It may be that the disease has progressed too far. The grip of subject-matter may be too strong to be broken. This editorial is a plea for a new approach in our testing programs. Suppose we set forth the facts in the test booklet, both the pertinent and the impertinent, thus making no demand for memorized knowledge. Can we then devote our energies to measuring the effectiveness of the thought processes that are required by the data? If we never measure memory for verbal symbols, can we place a sufficient premium

on thinking so that teachers will sense a new freedom to teach for understanding instead of information?

If we can redefine the goals of the school in terms of vital abilities to think, we shall use subject-matter as a means to these ends rather than as an end in itself. The pressure of the overcrowded curriculum can be relieved in no other way. With time to teach for valid goals the pupils will find that they have ample time to learn without homework. The course of study will no longer cover the encyclopedia. Brief classifications of the major types of experience to be included in the work of the school will replace long topical outlines of subject-matter. Even such a brief classification as this may suffice—art experience, science experience, history experience, and mathematics experience. Language experience will permeate all types of experience. If the classification here proposed seems to lend itself too easily to the old regime of content and skill mastery, it may be stated in other terms. The important criterion is that content and skill shall always be instrumental to higher ends.

In many classrooms the old slavery to subject-matter has been broken. The results of this freedom have not yet been evaluated, but the evaluation staff of the Progressive Education Association is now working on such an evaluation in the thirty schools which have been participating in the eight-year study. When the results of this evaluation are published, it should be possible to move more rapidly toward a program of studies calculated to reach goals of growth instead of goals of encyclopedic knowledge.

ARTHUR K. LOOMIS

REVIEWS

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GELLERMAN, WILLIAM. *The American Legion as Educator.* Contributions to Education, No. 743 (New York: Bureau of Publications, Teachers College, Columbia University, 1938), pp. ix + 280. $3.15.

The publication of this volume last spring was accompanied by an outburst of oratorical and editorial fireworks such as is accorded to few publications. Denunciation of the author, his sponsor, and the publisher of the book was the central theme of the speeches of the 1938 convention of the American Legion, and patrioteer vied with Legionnaire in pronouncing anathemas upon the heresies contained within these brief pages. Such a baptism of fire entitles the volume to receive a more critical examination than was evident in the vituperative fulminations of platform and press.

Dr. Gellerman begins his story with the formation of the American Legion by a group of Army officers who "chanced to be" assembled in Paris in February, 1919. These officers, intent upon forming an organization which would marshal World War veterans against Socialism, Bolshevism, I.W.W.-ism, and anarchy, launched their society and raised money for the purpose from "friends of the Legion" among American industrialists. From an analysis of the structure and methods of the Legion, Dr. Gellerman concludes that a majority of ex-service men are outside of the organization, and that those who are members are without an effective voice in the determination of policies. The leaders of the Legion have been drawn exclusively from the favored and ruling economic groups of the nation, and these men, through the "Americanism" program of the Legion, have waged unremittent warfare upon "subversive elements" which might threaten the private ownership of property and vested property rights. Through the pages of the *American Legion Monthly*, these leaders have attempted to "educate" Legionnaires in the fundamental soundness of the profit system and to enlist them against any proponents of governmental ownership or control of industry. At the same time, the official publication of the order has inculcated the concepts of militarism into the members by asserting the inevitability of war, urging increased armaments, favoring universal drafts, and excoriating pacifism. Moreover, the Legion has sponsored an extensive drive in the public schools in order to indoctrinate children with patriotic ideals. The Legion started American Education Week, sponsored essay contests on patriotic subjects, has sought to instill "a positive nationalism and a love and respect for the flag" through a course in flag history and etiquette in the curriculum, has endorsed a patriotic textbook for history courses, has opposed retrenchment in school expenditures, and has befriended a junior baseball program and the organization of Boy Scout troops—all in order to "protect the young from 'subversive' groups

by furnishing them 'constructive' leadership along what it considers to be the proper patriotic channels.''

Having thus surveyed the American Legion, Dr. Gellerman concludes that it is an ''instrument used by a privileged group in American Society'' whose peculiar effectiveness lies in its successful claim to serve as the ''court of last appeal in the use and interpretation of patriotic symbols.'' The great danger to this privileged class is a division of society along the lines of economic class interests, and the leaders of the Legion ''do not wish to be hurt in any process of social reorganization.'' Yet, Dr. Gellerman believes that the ''average ex-service man . . . could gain much more for himself through coöperating with the masses of the American people along lines of economic class interest'' and recommends that the membership abandon the organization. Moreover, Dr. Gellerman recommends that teachers avoid coöperating with the Legion and learn to work with labor, farmer, consumer's organizations, ''and those organizations of the underprivileged which have given teachers better support in behalf of academic freedom than teachers have received from any other section of American society.'' The American Legion, with its devotion to the interests of an exploiting class, is both fascist and unpatriotic.

Such, in brief, is the argument of this challenging book, and it is not surprising that it aroused the ire of the American Legion. What is surprising is that a reputable university published it under its imprint and presented it to the academic world under the guise of scholarship. However interesting the thesis might be, and however much it might be cluttered up with the accepted impedimenta of scholarship, the book is a polemic against the Legion rather than an objective evaluation of the Organization's educational work. The author avows a viewpoint which the Legion would brand as ''subversive,'' and condemns the Legion for not sharing it. Whatever social value such an attack may have, critical students will notice that the fundamental thesis is assumed and asserted rather than proved. In the absence of documentary evidence that the Legion was originally supported by financiers and industrialists, the author supplies insinuations, biased quotations, and innuendo. The author has failed to pursue his investigations into anything other than printed sources, and at every step in the development of his argument the conclusions are supplied by the author's preconceptions and are not inherent in the evidence. In its form—including bibliography, footnotes, dull writing, bad grammar, and an excess number of split infinitives—this work resembles a doctoral dissertation. In its content and methods it belies the claim to scientific objectivity, and no university is justified in accepting such partisanship in fulfillment of the requirements for the Ph.D., or in publishing polemics disguised as scholarship.

W. B. Hesseltine
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Crawford, Claude C., Thorpe, Louis P., and Adams, Fay. *The Problems of Education: A First Course for the Orientation of Prospective Teachers* (Los Angeles: Southern California School Book Depository, 1938), 239 pp. $2.50.

The Problems of Education is written as ''A First Course for the Orientation of Teachers,'' by an instructor of curriculum and methods, a psychologist, and a director of student teaching—all of the University of Southern California.

The book is divided into fourteen chapters, dealing with organization, finances, building, pupils, teachers, teaching and learning, psychological processes, guid-

ance and adjustment, research and measurement, and the like.

Each chapter opens with a page of introductory questions as orientation to the subject of the chapter. The remainder of each chapter is devoted to problems (from four to forty) classified under specific heads, one page being devoted to the presentation of each. Each main problem of a chapter opens with an introductory question. Following the introductory question, ten or twelve questions are asked under the side head "Issues." After the issues, under the side head "Activities," five suggestions are made for each main problem. These are of many varieties, among which are debate, symposium, panel discussion, one-minute talks, exposition, mimicking, experiment, collection of opinions, listing subjects, planning, drawing cartoons or maps, giving tests, class visitations, excursions, interviewing, preparing displays, etc. Following the suggested activities for each problem, on the same page, are references for study.

The authors suggest that ten or fifteen minutes of class time be devoted to each problem. A large part of the field of education is covered by all of the problems. Some problems are so comprehensive of a large body of subject matter and deal with technical matters to such an extent that one wonders what might be the value, to a class of beginners in a study of professional education, of a fifteen-minute classroom debate or a symposium for which there had been a corresponding half-hour of preparation, with four such activities packed into one period.

It would appear that selected problems might be valuable aids to almost any professional education course, but that to use the 207 problems as an introductory course in education would only confuse the beginning student. They are much more suitable for advanced students than for beginners. Not only could the beginner not solve any of the problems to his satisfaction, but so many principal problems, each divided into ten or twelve subordinate problems, could only result in failure to recognize any of them as problems. The student could not acquire the necesary background for making them real to him.

CHARLES EVERAND REEVES
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JOHNSON, JOHN THEODORE. ***The Relative Merits of Three Methods of Subtraction: An Experimental Comparison of the Decomposition Method of Subtraction with Equal Additions Method and the Austrian Method.*** Contributions to Education No. 738 (New York: Bureau of Publications, Teachers College, Columbia University, 1938), 76 pp. $1.60.

The experiments that have been reported dealing with the relative merits of various methods of subtraction have uniformly expressed differences in terms of accuracy of performance. One of the few studies that has dealt with this problem in terms of the rate at which children work is the above report by Johnson. After a rather lengthy discussion of the history of various methods of subtraction and a summary of previous experiments in this field, Johnson reports the results of his study of the relative merits of three methods of subtraction. He compares both speed and accuracy of work by three carefully equated groups, one using the decomposition method, one using the equal-additions method, and one the Austrian method. To get a measure of speed he tested the children in knowledge of subtraction combinations and then in their ability to work a variety of examples which included all of the combinations in the form and

order in which they appeared in the combinations test, given first. The pupils were in both cases given as much time as was needed to complete the test. The difference in the time for the two tests for each pupil was counted as the time required for the subtraction activity. A unique method of determining the method of subtraction used by the pupils was employed, namely, asking them to express in writing the method used in working two examples, so selected as to reveal differences in procedure. In all there were about 1200 pupils from grades 3 to 8 in the three groups. Of them 526 used the decomposition method and 526 used the equal-additions or the Austrian method, both of which increased the subtrahend figure as contrasted with the former group which changed the minuend figure when "borrowing," but not the subtrahend.

Johnson found that the decomposition method required more time than either of the other methods and that it produced more errors. He found that there is only a slight difference in accuracy in favor of the equal-additions method when compared with the Austrian method, not statistically significant. The difference in time—"44 percent in favor of the Austrian method"—over the equal-addition method is "large and is statistically significant." It is an unfortunate fact that the group using the Austrian method was less than one-third as large as the group using the decomposition method. A further comparison between two highly accurate groups showed that the differences between the decomposition and combined equal-additions and Austrian methods were significantly in favor of the latter group in all comparisons. These data are important since they are decisively in favor of a method that is not as widely taught in this country as the decomposition method. However, since the results are for a mixed group of pupils from the upper grades, further data are needed before one can be sure which method to teach in the primary grades. It may be that the Austrian and equal-additions methods are more difficult to rationalize than the decomposition method. This experiment should be repeated with groups of children in the grades in which the topic is first presented and careful studies should be made to determine not only the learning difficulty of the three methods, but also the speed and accuracy of work of the pupils. If these results turn out to be as favorable for the Austrian method as the findings by Johnson, one would conclude that all schools should teach this method.

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University of Minnesota

HOCKETT, JOHN A., and JACOBSEN, E. W. *Modern Practices in the Elementary School* (Boston: Ginn and Company, 1938), pp. v + 346. $2.60.

During the past few years there have appeared a number of books dealing with practices used in school systems which accept as the basis of their work the "modern organic conception of learning." The above book by Hockett and Jacobsen is an important contribution in this field. The authors conceive of teaching as "the process of stimulating and guiding the activities of children so that rich and varied experiences will result." In their discussion the authors weave together theory and practice so that "the justification and application of educational principles are presented simultaneously."

The organization of the treatment is based on various aspects of instruction through "units of work." The topics dealt with in separate chapters include such items as organizing the class, developing a unit of work, managing the daily program, making the most of the

environment, creative abilities, making discipline educative, meeting individual needs, meeting the needs of unusual children, and the teacher's resources. From the list of topics it should be evident that the authors deal with procedures that should increasingly socialize the work of the school and that should bring out the essential relationships among the areas of the curriculum rather than with a discussion of formal, compartmentalized education. The concept, "unit of work," as they present it, is primarily a plan for integrating all the work the children do in school about major topics, problems, and activities rather than the plan so often followed of using as the basis of organization the conventional subject-matter divisions. The emphasis on "creative abilities," use of the environment, individual differences, and integration of subject-matter is typical of the organic conception of learning.

This book is an excellent exposition of procedures to use for socializing the work of the school. It would serve as an introductory course for teachers interested in the study of modern practices in general. Each chapter contains a list of topics for discussion and references for further study. It is to be hoped that this general discussion will be followed by a similar book dealing with modern methods of teaching in each of the major areas of the curriculum. The need of diagnosis is pointed out but there is no discussion of procedures to use either for diagnosis or treatment. An excellent additional chapter would have been a statement about methods of evaluating the outcomes of the enriched kind of instructional program that is presented. The book is interestingly written and is well organized. It contains a wealth of suggestions for teachers.

LEO J. BRUECKNER
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REED, HOMER B. *Psychology of Elementary School Subjects.* Revised Edition (Boston: Ginn and Company, 1938), pp. xi + 582. $2.40.

In this revised edition, Professor Reed has made use of much of the research which has been carried on in this field since the first publication of the book in 1927. The author's study of this research has resulted in some conclusions which are quite different from those previously suggested; for example, in the discussion of Spelling, it is stated that "there appears to be no justification for presenting words in syllables—except in special cases" (p. 237) which is opposed to the statement, "Present long words in syllables" (p. 267; 1927). It is doubtful, however, that modern research on Handwriting justifies the conclusion, "Balancing the advantages and disadvantages of each form of writing, we should say that there is no good reason for preferring manuscript to cursive writing except in so far as it is a matter of taste." (p. 271). The revised composition of the excellent chapter summaries, and the use of footnote references in place of unwieldy chapter bibliographies are improvements in the new edition.

Chapters dealing with recent additions to the elementary curriculum (social studies, elementary science, health, physical education) have been added. While in the main the treatment of these new subjects will be very helpful to the teacher, it is surprising to find more than half the chapter on Health and Physical Education devoted to a rather technical discussion of the psychology of motor skills and to find very little discussion of mental hygiene.

This reviewer feels that the greatest point of difference between the two editions of this book is a change in the psychology of the author. The 1927 edition expressed a more or less rigid in-

terpretation and application of the Thorndikian laws of learning. In the 1938 edition, "the law of association" has become the "principle of organization," "repetition" is "practice," and "bonds" are now "tasks" or "connections." It would appear that, in the three introductory chapters at least, Professor Reed has been influenced to a degree by Gestalt psychology.

The author's discussion of the elementary school subjects presents a very satisfactory review and interpretation of scientific research from the standpoint of achievement in the subjects themselves. The outlines of diagnostic and remedial work should be valuable to the teacher. The treatment of individual differences is excellent in regard to differences in achievement due to physiological factors, such as age, sex, sight, and hearing, etc., but it is rather deficient in regard to differences in emotional stability, social adjustment, etc. The basic assumptions of the author's educational theory appear to be that learning is the formation of specific habits; that the method, par excellence, is drill. It is disappointing to find the author of a modern book bearing this title reaching such a conclusion as "the great variety of meanings attached to important terms such as democracy and socialism . . . indicate that high school pupils know very little about important social concepts relating to modern life." (p. 439). Is it to be inferred that immature children would be given an understanding and appreciation of these concepts through constrictive definition? Is it not true, rather, that such abstractions necessarily derive their meaning and significance from the whole life and experience of the individual?

The most vital criticism of Professor Reed's book which this reviewer advances is that there is an ever-emphasis on "measurable" achievement in the curricular subjects and a tendency to regard the pupil as that which is capable of producing a score on a standardized test, rather than as a dynamic developing personality.

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RESEARCH ABSTRACTS and BIBLIOGRAPHIES

Address all communications relative to research abstracts and bibliographies to A. S. Barr, University of Wisconsin, Madison, Wisconsin.

BULLETINS

ADE, LESTER K. *Major Issues in Financing Education in Pennsylvania*, Bulletin No. 135 (Harrisburg: Department of Public Instruction, Commonwealth of Pennsylvania, 1938), 99 pp.

The bulletin attempts to treat the problem of financing education in Pennsylvania through a discussion of: basis for the distribution of state school moneys, determination of the educational program, measurement of the educational task, transportation of pupils, and measurement of the ability to support education.

CHARTERS, W. W. (Editor). *Educational Research Bulletin*, XVII (Columbus: College of Education, Ohio State University, Dec. 7, 1938), 27 pp.

This issue of the Bulletin is devoted to articles on: testing ability to use data in the fifth and sixth grades, and evaluation of objectives in family relationships.

GREENLEAF, WALTER J. "Student Loan Funds" Bulletin No. Misc. 2141 of *Vocational Division, Office of Education, Department of the Interior* (Washington: Office of Education, United States Department of the Interior, 1938), 19 pp.

This bulletin gives information on student loan funds obtained through questionnaires and lists the general, denominational, and state loan funds available to college students with the qualifications necessary in each case.

HOLY, T. C. (Chairman) AND OTHERS. "The School Plant and Equipment," *Review of Educational Research*, VIII, No. 4 (Washington: American Educational Research Association, October, 1938), 125 pp.

This number of the Review deals with the school plant and equipment and reports studies on: operation and maintenance of the school plants, equipment, apparatus and supplies, heating, ventilation, and sanitation of school buildings, school illumination, cost of school buildings, foreign school buildings, technics of school building surveys, plant development for higher education, including junior colleges, pupil transportation equipment, state studies of local school units as related to the school plant, trends in school architecture and design, court decisions in the school plant field, and status of research in the school plant field. Bibliography.

HILBERT, LYLE WARREN. "A Study of the Status of the Rural High School Principal in Kansas," *Studies in Education Number*, XVIII, No. 10 (Emporia, Kansas: Kansas State Teachers College of Emporia, October, 1938), 27 pp.

The author reports a study based upon data from the principals' report to the state department of 305 rural high schools in Kansas analyzed according to: salary,

experience, and tenure of rural high-school principals of the different class high schools of Kansas, educational training of these principals, administrative factors pertaining to these principals.

SMITH, NILA BANTON. "Remedial Instruction in Reading with College Freshmen," *Bulletin of the School of Education, Indiana University*, XV, No. 1 (Bloomington: Bureau of Coöperative Research, School of Education, Indiana University, December, 1938), 35 pp.

The author employed the control group technique in the investigation of remedial instruction in reading with college freshmen and the data seem to indicate that the students who were given remedial instruction made substantial gains in all of the aspects of reading measured.

WEST, RUTH. (Editor) AND OTHERS. "Utilization of Community Resources in the Social Studies," *National Council for the Social Studies, Ninth Yearbook* (Cambridge: The National Council for the Social Studies, 1938), 229 pp.

This Ninth Yearbook of the National Council for Social Studies makes available a record of what many community-centered schools are doing by offering discussions on: education for democratic living, the teacher and the community, some techniques of community study, special phases of community study, education through community participation, the world at home, community study in other countries, and testing for community information.

WILLIAMS, R. C. "Type of School District as a Factor in High School Attendance in Iowa," *Research Bulletin*, No. 23 (Des Moines: Department of Public Instruction, State of Iowa, October, 1938), 86 pp.

The author made an intensive study of high-school attendance in Iowa and concludes that the greater the distance a child lives from high-school the less the chance that he will enter high-school, although transportation to school at public expense for rural children who complete the eighth grade materially increases the proportionate number who will attend high-school.

Wisconsin Education Association. "School Funds: Where They Come from—Where They Go," *Research Bulletin of the Wisconsin Education Association* (Madison: Wisconsin Education Association, December, 1938), 24 pp.

The Wisconsin Education Association presents an analysis of the appropriations and expenditures of school moneys and offers a comparison with other state functions for the years 1930-1936 inclusive.

EDUCATIONAL ADMINISTRATION AND SUPERVISION

DOWNS, MARTHA. "Significant Trends in Teachers College Personnel Practices," *Educational Administration and Supervision*, XXIV (November, 1938), pp. 615-619.

This article discusses the trends in teachers college personnel practices as revealed through conference and correspondence permitting the author to conclude that generally it is believed that there is an increasing awareness of the magnitude and significance of personnel practices and steady progress in the direction of improved programs.

GRAY, WILLIAM S. "Selected References on Teacher Education," *The Elementary School Journal*, XXXIX (December, 1938), pp. 298-307.

The author presents a bibliography of publication on teacher education between

July 1, 1937 and June 30, 1938 which discuss significant issues relating to the education of teachers in elementary and secondary schools and in higher institutions.

MONROE, WALTER S., AND MARKS ARLYN. "General Methods of Teaching Evaluated: Results of Research," *Educational Administration and Supervision*, XXIV (November, 1938), pp. 581-592.

The authors present an evaluation of the lecture, recitation, laboratory, project, socialized recitations, and the Morrison plan and conclude that more research is needed in this field before conclusions can be drawn.

MURDOCK, FORREST, SHIPP, FREDERICK T., AND HAND, HAROLD C. "A Schedule That Overcomes Administrative Lag," *California Journal of Secondary Education*, XIII (December, 1938), pp. 493-495.

The authors discuss a plan for making administratively possible for correlated or coöperative teaching to be done by uniting curriculum and guidance.

SMITH, C. CURRIEN. "Specialization and the Education of Teachers," *Educational Administration and Supervision*, XXIV (November, 1938), pp. 593-608.

The author discusses the trend toward specialization in teacher education and the trend toward liberalization in secondary education and proposes that a program of general education be set up for the prospective secondary-school teacher which will reflect the program of general education considered necessary for the secondary school student.

CURRICULUM CONSTRUCTION

CONNETTE, EARLE. "Bibliography in Music Education for Classroom Teachers," *The Elementary School Journal*, XXXIX (December, 1938), pp. 269-279.

The bibliography presented is divided into the following divisions: music in education and life—its philosophy, place and function in American schools, classroom problems in music education, utility of music performance, use of radio, appreciation lessons, integration, teacher preparation, and administration and supervision.

WYLER, ROSE. "Radio: An Elementary Science Teaching Tool," *Teachers College Record*, XL (December, 1938), pp. 222-228.

This article presents a general survey of the kinds of radio broadcasts that are useful in the teaching of elementary science.

PSYCHOLOGY OF LEARNING AND TEACHING

KVARACEUS, WILLIAM C., AND WILES, MARION E. "An Experiment in Grouping for Effective Learning," *The Elementary School Journal*, XXXIX (December, 1938), pp. 264-268.

The authors discuss an achievement-ability grouping experiment conducted in the second grade and on the basis of test scores growth in academic achievement per pupil in experimental group was more than the average amount of pupil growth during the year.

MILLER, WILLIAM A. "What Children See in Pictures," *The Elementary School Journal* XXXIX (December, 1938), pp. 280-288.

The author studied what 100 children in third grade saw in six pictures without the suggestion or stimulation provided by any definite direction or guidance and found that: children reported seeing relatively few of the items which make up a picture, the items of a picture are seen in isolation rather than as parts of a unified whole, the most important items in a picture often escape the notice

of children, children with higher intelligence quotients tend to identify more items in pictures than do children with lower intelligence quotients, and that chronological age and sex are not important factors in the identity of items in a picture.

WRIGHTSTONE, J. W., RECHETNICK, JOSEPH, MCCALL, WILLIAM A., AND LOFTUS, JOHN J. "Measuring Intellectual and Dynamic Factors in Activity and Control Schools in New York City." *Teachers College Record*, XL (December, 1938), pp. 237-244.

This article deals with a comparison of the results obtained from activity and control schools on the Modern School Achievement Tests and certain other tests of intelligence and dynamic factors and presents evidence which seem to indicate that the factors measured have been developed to a greater extent in the activity program that in the conventional type of program.

PUPIL GUIDANCE, WELFARE AND DEVELOPMENT

BROOKS, HAROLD B. "New Cumulative Record for Schools of State," *California Journal of Secondary Education*, XIII (December, 1938), pp. 500-504.

The author summarizes briefly the findings, conclusions, and recommendations of a study on 527 cumulative record forms made in 1937.

RUSSELL, WILLIAM F. "For the Defense of Democracy," *Teachers College Record*, XL (December, 1938), pp. 181-205.

The author discusses at length the different educational philosophies found in the ideas of democracy, dictatorship, liberalism, equalitarianism, Marxism, and socialism and presents the view that a program of education for citizenship is necessary if our form of government is to survive.

SPRINGER, N. NORTON, AND ROSLOW, SYDNEY. "A Further Study of the Psychoneurotic Responses of Deaf and Hearing Children," *The Journal of Educational Psychology*, XXIX (November, 1938), pp. 590-596.

The Brown Personality Inventory was given to 59 pairs of deaf and hearing children between the ages of 12 and 14 years in an attempt to determine group differences in maladjusted behavior and on the basis of their psychoneurotic responses it appears that the deaf children are much more neurotic than the hearing children.

STATISTICS, MEASUREMENTS, AND SCIENTIFIC TECHNIQUES

LEY, JOSEPH. "Evaluation of Test Items by the Method of Analysis of Variance," *The Journal of Educational Psychology*, XXIX (November, 1938), pp. 623-630.

The author presents in detail a procedure which will serve to validate and at the same time weigh test items in objective tests.

WOODROW, HERBERT. "The Effect of Practice on Test Intercorrelations," *The Journal of Educational Psychology*, XXIX (November, 1938), pp. 561-572.

The data on the effect of practice on test intercorrelations from four groups of students given practice in from four to seven tests indicate that if the reliability of the tests is kept constant, a decrease in their intercorrelations results.

NEW TESTS

Pintner General Ability Test: Verbal Series, by Rudolf Pintner, Yonkers-on-Hudson World Book Company, 1938.

The Pintner General Ability Tests, Verbal Series, have been developed in an effort to fulfill modern requirements for a complete series of group tests of gen-

eral intellectual ability or aptitude covering all levels from kindergarten age to maturity, as provided by the Pintner-Cunningham Primary Test, Pintner Elementary Test, Pintner Intermediate Test, and Pintner Advanced Test. Norms, manual, perforated stencil key.

Pupil Adjustment Inventory, Part A, by T. L. Torgerson. Milwaukee: E. M. Hale Company, 1938.

Pupil Adjustment Inventory offers a four point rating scale for eighteen factors commonly associated with pupil adjustment.

The Diagnosis and Treatment of Pupil Maladjustment, Part B, Case Study Record, by T. L. Torgerson. Milwaukee, E. M. Hale Company, 1938.

The Case Study Record is intended as an aid to the teacher making a systematic study of the important factors in the life of the child which are related to his behavior. The record is composed of pupil adjustment inventory, pedagogical factors—school history and study habits, physical factors—physical efficiency and health status, emotional and social factors, home environment, intelligence tests, achievement tests—survey and diagnostic, aptitude tests, summary and interpretations, remedial treatment and results.

The Diagnosis and Treatment of Pupil Maladjustment: Part C, Symptoms, Causes and Remedies, by T. L. Torgerson. Milwaukee: E. M. Hale Company, 1938.

This handbook for teachers is divided into the following parts: 90 causes for maladjustment based upon the ten symptoms listed in the pupil adjustment inventory, remedial procedures for the correction of pupil maladjustment with suggestions for their administration, selected references.

The Diagnosis and Treatment of Pupil Maladjustment: Part D, Abbreviated Case Study Record, by T. L. Torgerson. Milwaukee: E. M. Hale Company, 1938.

A folder providing for the recording of information regarding the pedagogical, physical, emotional, social factors and scores on tests of intelligence, achievement, aptitude, personality and adjustment.

The Diagnosis and Treatment of Pupil Maladjustment: Part E, Cumulative Pupil Adjustment Record, by T. L. Torgerson. Milwaukee: E. M. Hale Company, 1938.

This cumulative record folder covers grades kindergarten-twelve inclusive and allows for the recording of the following data: school history, study habits, physical efficiency and health status, interests and attitudes, home environment, intelligence, achievement, aptitude, personality, adjustment, and other test scores, symptoms and causes, and summary of remediation.

Wrightstone Scale of Civic Beliefs, by J. Wayne Wrightstone. Yonkers-on Hudson: World Book Company, 1938.

The scale comprises a series of 80 statements of attitudes characteristic of either liberals or conservatives in the fields of racial, international, national political, and national achievements and ideals. Scores on the two forms correlate .897; when corrected the reliability is .94. Norms are also available.

RESEARCH NEWS and COMMUNICATIONS

Address all research news and communications to Carter V. Good, Teachers College, University of Cincinnati, Cincinnati, Ohio.

Secondary Curriculum.—As previously reported in this journal, the Commission on Secondary School Curriculum was established in 1932 by the Executive Board of the Progressive Education Association to study the fundamental problems of reorganization in secondary education. Its work, now drawing to a close, has been carried on by committees in various subject-matter areas and by a Study of Adolescents.

Recognizing Secondary Education, which sets forth the basic philosophy and approach of the Commission, will be published in the spring. The authors are V. T. Thayer, Chairman of the Commission; Caroline B. Zachry, Director of Research; and Ruth Kotinsky, Secretary.

Two reports of subject-matter area committees have already appeared: *Science in General Education*, the report of the Committee on the Function of Science in General Education, and *Teaching Creative Writing*, by Lawrence H. Conrad and the Committee on the Function of English in General Education. The Committee on the Function of Language in General Education is preparing two reports which will appear in 1939—one entitled *Language in General Education* and the other, *Enriching the Reading Program* (bibliographies of prose fiction for supplementary reading in the senior high school and college), by Elbert Lenrow. Other volumes in this series, to appear in 1939, are the reports of the Committees on the Function of Art, Mathematics, and Social Studies in General Education.

The publications of the Study of Adolescents (which has also contributed to the reports of the committees) are addressed to teachers, curriculum makers, school administrators, research psychologists, and parents. Its findings are intended to provide a meaningful description of adolescent development, to suggest techniques whereby schools may gain additional understanding of their students, and in general to show the relationship between the demands of healthy personality development and the process of educational reconstruction on the secondary level.

The influence of the Commission's work does not wait upon the appearance of its publications. The Commission has kept in constant touch with workers in the field and has maintained coöperative relationships with a number of secondary schools. Members of its staff have participated in study conferences and summer workshops for teachers, administrators, and other interested persons. This close touch with on-going educational practice has not only accelerated the dissemination of the Commission's ideas, but should also serve to insure the relevance of published recommendations to actual problems confronting educators.

Curriculum Committees.—The Society for Curriculum Study has at present several committees at work investigating various phases of curriculum activities and

exploring possibilities for the reorganization of the curriculum.

One of these committees is on Secondary Education in a Unified Program. A brief report of the plan of this committee appeared in the *Curriculum Journal* in October, 1938. A sub-committee at work on one phase of this plan is preparing a brief monograph on procedural principles which administrative officers and faculty members might follow in planning a reorganized program of secondary education which would be an integral and appropriate part of a total program of community education. The bulletin will deal with the methods of curriculum derivation and organization, methods of social interpretation and lay participation, and methods of evaluation.

The Committee on Textbooks is completing the compilation of textbooks for 1938 for elementary and secondary schools. Copies of these books are submitted by publishers to the committee and only copies of textbooks actually examined by members of the committee are listed. This list will be published in the *Curriculum Journal* shortly after the first of the year. From month to month portions of the list appear in the *Educational Scene*, a Los Angeles school journal distributed largely on the West Coast.

The Committee on Regional Conferences and Meetings assists the state or regional organizations dealing with curriculum problems. About thirty states have meetings or study group organizations as part of their state curriculum improvement program. This committee brings together for the annual meeting of the Society for Curriculum Study problems of state curriculum programs.

The Committee on Annual Bibliography makes available to readers of the *Curriculum Journal* a selection of the most significant studies and reports which have appeared in the field of curriculum during each current year. Approximately two hundred titles are included.

The Committee on Courses of Study reviews and reports to the *Curriculum Journal* the outstanding courses of study produced in the United States each year.

At present a Committee for Home and Family Life, which is a joint project with the Department of Home Economics of the National Education Association, has recently been formed to study the values desired for inclusion of home and family life materials in the curriculum and the ways in which schools may aid in an educational program concerned with home and family life.

A Committee on Pre-Service and In-Service Preparation of Teachers has been designed to make an intensive study on teacher education problems in the United States.

A committee called the Rural Education Committee proposes to review the foundations of rural community life and to study the present challenges to the development of an adequate program of rural education.

Two other committees are at work, one a Long-Time Plan Committee which coördinates the work of all committees and suggests plans for future activities of the Society for Curriculum Study, and another, the Committee on the Annual Meeting, prepares the program for the annual meeting in connection with the American Association of School Administrators.

Study of Reading.—Late in 1937 the Committee on Measurement and Guidance of the American Council on Education approved the appointment of a sub-committee to study the problems of reading at the level of general education with special reference to high schools and junior colleges. The project was placed under

the immediate direction of the Steering Committee composed of William S. Gray (chairman), Arthur I. Gates, and Ralph W. Tyler. The services of Neal M. Cross, Menlo Junior College, Palo Alto, California, were secured for the period of a year. After defining in considerable detail the general character of the project, the Steering Committee invited a number of specialists in one of more aspects of reading to participate, namely, Edgar Dale, Ohio State University; Harold A. Anderson, the Laboratory Schools, University of Chicago; Louis Zahner, Groton School, Groton, Massachusetts; Lou L. LaBrant and J. Wayne Wrightstone, Ohio State University; Ruth Strang, Columbia University; Bernice E. Leary, recently of the Office of Education, Washington, D. C.; Edward A. Wright, University of Dubuque, Dubuque, Iowa; and Leon Carnovsky, Graduate Library School, University of Chicago.

The purpose of the sub-committee, as defined in the document which recommended its appointment, was to make an intensive, critical survey of recent trends and challenging problems in reading in secondary schools and colleges, to prepare a report which may serve as a guide to school officers and teachers who are seeking to improve reading at the levels indicated, and to define problems which are in urgent need of further investigation. The project was to continue for one year and was recognized as preliminary to a broader program of study and investigation which might continue for a much longer period of time.

During the spring and summer of 1938 the group carried on its studies intensively under the direction of the Steering Committee. Its findings were summarized in a preliminary draft of materials which were subjected to vigorous criticism during a five-day conference in September. The various contributors have since been at work revising their sections in the light of the constructive suggestions received both at the conference and from selected critics to whom their reports were sent. Needless to say, the study thus far has brought to light much information applicable to secondary schools and junior colleges. It has located findings from previous studies which throw light on many of the reading problems which students face, and it has indicated various procedures which offer promise for improving teaching practices.

It is planned to subject the revised report to further criticism during the winter months. It is hoped that the final report will be available for publication early in the spring of 1939.

Remedial Reading Project.—Much attention has been directed toward the field of remedial reading in recent years. However, due to wide differences in results obtained, it seems advisable that much more research be done in the field. A committee appointed in March, 1938, by the Oregon Research Council to direct this type of investigation, is now ready to undertake a carefully controlled intensive project approved by the Council, with Elizabeth Montgomery of the University of Oregon as chairman.

It is the opinion of the committee that further research should include a wide range of possible determining factors such as health, sight, hearing, speech, etc., and to attempt to determine not only their incidence as individual factors in retardation of reading, but also their incidence within a large pattern of possible disturbances. Any one of the twelve different phases of data to be secured from each case might be only symptomatic in itself, but the condition shown by the total pattern might prove decidedly significant.

An accompanying phase of the research

is to attempt to determine the effectiveness of certain instruments and methods which are used by teachers, supervisors, and administrators in education to "screen out" those children having serious deficiencies in sight and hearing. It seems important that the relationship of the results, as indicated by the data, in ocular tests made by the Snellen Chart, the Keystone Telebinocular, the Snellen Chart plus a *plus one* lens, and a thorough minimum essential ocular examination be ascertained. It is also considered worthwhile to determine the relationship of findings in keenness of hearing through use of certain schoolroom practices and the use of the audiometer.

It is expected that the data will be collected from several different locations throughout the state of Oregon. The committee anticipates that at least each branch of the Oregon System of Higher Education will coöperate in the project. The various phases of the examination of cases will be done by specialists, and control cases will be secured by the matched case method.

Textbook Clinic.—Under the auspices of the American Institute of Graphic Arts, New York City, a textbook clinic has been formed for the purpose of promoting greater interest in improved textbook design and of providing a common meeting ground for people interested in the writing, publishing, illustrating, designing, manufacturing, and use of textbooks. Several meetings of the Clinic have been held under the chairmanship of Arthur Thompson, designer for the Bell Telephone Laboratories.

Library Terminology.—The Committee on Library Terminology now has a full-time editor who began work on the glossary of library terms the middle of August, 1938. The manuscript should be ready to submit to the Editorial Committee of the American Library Association in August, 1939. Therefore, it is hoped that the report will be published in the fall of 1939 or, more likely, early in 1940.

The scope of the glossary as defined at the present stage is expected to include:

1. Technical terms that define or explain procedures, techniques, or equipment peculiar to library work, unless purely, or largely, local in significance.

2. Technical terms from other fields, especially the allied ones of bibliography and printing, provided that they are utilized in connection with library procedures and techniques or in the interpretation of bibliographic entries, and that their meanings are not entirely obvious from common usage.

3. Highly selected general terms used in library work, particularly those describing types of material known under names that may be somewhat obscure.

Susan Grey Akers of the University of North Carolina is Chairman of the A.L.A. Committee on Library Terminology.

Carnegie Corporation.—The annual report of the Carnegie Corporation of New York for the year ended September 30, 1938, is unusually analytical and penetrating in its discussion of grants-in-aid for scholarly work, useful publications subsidized, the graduate school, relations between the public and foundations, the outlook for funds for philanthropy, and procedure in making grants.

The appropriations authorized during the year were as follows:

Library interests	$ 571,600.00
Adult education	180,500.00
The arts	646,125.00
Research, studies, and publications	554,660.00
General	1,877,250.00
Total grants	$3,830,135.00

Guggenheim Fellowships.—The report on John Simon Guggenheim Memorial Fellowships granted in the years 1937 and 1938 and a record of the accomplishments, during the same biennnium, of fellows previously appointed is now available. The Foundation's fellowships are available to assist research in any field of knowledge and creative work in any of the fine arts. Shortly stated, the Foundation seeks to find, or more often, to recognize, the exceptional scholar and artist and having found him to make it financially possible for him to do the work he most wants to do. All of the Foundation's grants are made in terms of fellowships. It does not make what are ordinarily denominated grants-in-aid; that is, it does not, except as a part of fellowship stipends, make grants for materials, apparatus, books, or the other materials of research and creative work. The Foundation's grants of funds are never made to organizations, whether for their general support or for specific tasks or projects. It does not grant subventions for performances of musical or theatrical works, for exhibitions of any kind, nor for the patenting and promotion of inventions. Publication subvention is granted only, and that on rare occasions, to fellows to assist the publication of works produced by them as fellows.

Kappa Delta Pi Award.—Manuscripts for the third $1,000 research award of Kappa Delta Pi must be in the hands of E. I. F. Williams, Heidelberg College, Tiffin, Ohio, not later than September 1, 1939. The award is for the best original study treating any significant phase of the history of American education. Details of this competitive award may be secured from Professor Williams.

Study of Adolescence at Yale.—The Adolescence Study Unit of which W. W. Greulich is chairman, is a joint undertaking by the Yale University School of Medicine and the Institute of Human Relations, aided by a grant to the former from the General Education Board of the Rockefeller Foundation. The project is an attempt to utilize the resources of anatomy, biochemistry, pediatrics, physiology, and psychology in the study of adolescent children.

The work thus far has consisted chiefly of an investigation of changes in children associated with sexual maturation. Particular attention has been paid to the quantities of pituitary and of estrogenic and androgenic hormones in the urine of puberal children; and an attempt has been made to relate the quantities of such material excreted with skeletal development and with the degree of development of primary and secondary sexual characters. A large percentage of the children on whom hormone assays were made and other somatic data obtained were submitted to various psychological procedures designed to test what might be termed the maturity of their interests.

The program includes an X-ray study of the growth and development of the female pelvis during puberty. This is an aspect of skeletal development which is apparently very closely related to sexual maturation, and one about which very little exact information exists. The pelvic roentgenograms are made according to Thoms' method of pelvimetry, by means of which the exact dimensions and configuration of the pelvic inlet can be determined. It is proposed to repeat these pelvic X-rays on the same girls at intervals of approximately a year, in order to follow the changes in the size and shape of the pelvis which occur during that period.

In order to evaluate changes in the pelvis of children as disclosed by X-ray, it was necessary to have a more adequate

idea of what the pelvis of a normal woman is like than was available in the existing literature. With the collaboration of Dr. Herbert Thoms, of the Department of Obstetrics and Gynecology of the Yale University School of Medicine, an X-ray study of the pelvis of approximately 700 young white women was made. This, the most comprehensive roentgenological study of the female pelvis which has thus far been made, provides for the first time, a really adequate notion of what the pelvis of the present-day white woman is like and will make it possible to interpret more intelligently the changes which occur in the pelvis of girls during adolescence.

Post-mortem material was obtained from a large number of children for the purpose of studying some of the changes which occur in certain endocrine and other organs in connection with sexual maturation. It is believed that these investigations will add materially to the existing knowledge of the physical and mental development of boys and girls during this important period of life.

Master's Essay.—At the University of Cincinnati a distinction has been made between the research type of Master's thesis and the essay. In order to meet the needs of students who are primarily interested in teaching, in breadth of training through course work, and in "consumption of research" rather than specialization in educational research, a substitute (the Master's essay) for the thesis is permitted, at the option of the candidate with the consent of the adviser. The fundamental distinction between the Master's thesis and the Master's essay is that *the thesis is of a strictly research character*, involving an original investigation in some field of education and requiring the application in this field of one or more of the recognized techniques of research (historical, survey, experimental, genetic, case-study, correlational, etc.), while *the essay need not be of a strictly research character*, although involving the completion of a piece of work of equally high quality. Thesis and essay must include an account of the problem, procedure, and results. The varied forms which may be taken by the Master's essay will permit students with talents and interests other than those directly required in research work to select some other medium through which to demonstrate their qualifications for an advanced degree.

The Master's essay, which receives no course credit toward the Master's degree, as a substitute for the thesis, must show ability to select, integrate, and evaluate data with respect to some educational problem or procedure, and requires the same standards of effective writing as the research thesis. Illustrations of the essay type of report are: (a) an analytical review of the literature on an educational problem, (b) preparation of a textbook or course of study, (c) development and evaluation of a teaching, administrative, or supervisory plan, and (d) creative writing. These four types of the Master's essay may be described briefly as follows:

(a) The Master's essay may be a critical and interpretative analysis of the literature in a selected field of education. For many educational problems which have inspired extensive discussion or prolonged and varied investigation, adequate summaries and evaluations of the literature are not available. In such cases opportunity arises for a valuable contribution in the form of a Master's essay. Such an essay should not be attempted without a careful canvass of the literature, both to insure that the review being undertaken is not a mere repetition of one already available, and to guarantee that important sources are not overlooked. Reviews of the literature of many fields are avail-

able in various sources, especially in the *Review of Educational Research* and in the *Psychological Bulletin*. These reviews are likely to be broader in scope and more abbreviated in presentation than would be the case in a Master's essay, but may suggest the type of work required. A competent essay of this type will be one in which the results of various theorists are compared and synthesized, in which points of view, procedures, and evidence are classified and interpreted, and in which educational implications are pointed out with clarity.

(b) The Master's essay in the form of a textbook or course of study should include a careful analysis of the sources of information, related literature, detailed procedures, and problem solving processes which served as a foundation for or entered into the work. In other words, a well reasoned and carefully written account of the problem solving approaches employed is at least as important at the graduate level as the end product in the form of the text or course of study. In general, this type of report should be of such quality as to meet publication standards.

(c) The Master's essay which reports the development and evaluation of a teaching, administrative, or supervisory plan should include a critical treatment of the sources or factors (current practice or conditions, authoritative opinion, educational theory, related literature, or evidence, careful observation, etc.) which led to the formulation of the given plan. Evaluation is obviously an important aspect of this type of report, including criteria deduced from such sources as historical background, best practice, expert judgment, investigational evidence, pertinent educational literature, experimental tryout, etc.

(d) The Master's essay may be a piece of creative work, possessing both intrinsic merit and educational significance. Such a piece of work may be in any of the fields of artistic creation, provided that it is in keeping with the student's program of courses and teaching specialization, and that it is presented with an accompanying essay descriptive of its development and its significance for education. Such an essay will have the function of interpreting the creative production and justifying it in terms of its educational contribution. A high standard of excellence will be required for the acceptance of a piece of creative work. The faculty may secure the judgments of experts in the given artistic field in determining whether work submitted is worthy of acceptance. Examples of creative work such as might be acceptable, together with the accompanying essay, are the score of a choral work for children's voices, suitable for a music festival; a group of mural friezes appropriate for a high school classroom devoted to the teaching of Latin; a series of radio sketches interpreting in dramatic form the problems of parental education; and a collection of short stories based upon the experiences of a teacher in a school located in an underprivileged area.

Philadelphia Research.—The activities of the Philadelphia Division of Educational Research are well described by Philip A. Boyer, its director.

In the conduct of a large educational enterprise such as that of the Philadelphia public school system, administrators and teachers alike find themselves confronted with a continuing series of new and difficult problems. The wise solution of these problems requires complete knowledge of all contributing conditions and thorough-going understanding of a basic philosophy of education. Sometimes the necessary knowledge is immediately at hand or readily obtained. In such cases

administrative officers and teachers proceed to solve their problems directly. Sometimes the detailed knowledge necessary to solve a problem calls for extensive study in widely different but related fields. In such cases administrators and teachers must have at hand the services of research workers for carrying on the careful, critical, diligent, and protracted investigation upon which sound solutions may be based. The Division of Educational Research and Results gathers, analyzes, and interprets a wide range of detailed facts relative to the operation of the public school systems. The analysis of these facts and their interpretation in terms of sound educational philosophy provide a continuing self-survey upon the basis of which educational policy may be modified and adjusted to meet the continually changing needs of the community.

In the early years the division's initial activities were directed mainly to the relatively limited areas of educational research represented by the learning activities of pupils. Emphasis was placed upon the discovery and recognition of the wide ranges in individual differences of ability and achievement represented in groups of pupils however closely classified. In the main, the problems studied were those having to do with the effective organization of instructional groups, the adjustment of school activities to the capacities and needs of pupils, practical devices for individualizing instruction, detailed diagnosis of group and individual difficulties, appropriate remedial procedures, and the development of plans for insuring the most profitable progress of pupils toward realizing the major objectives of the school.

As the division's activities expanded within the field of instructional research it developed more general recognition of the intimate inter-relation of all the varied aspects of the educational problem. Instructional research involves class size and teaching loads as well as pupil classification; teacher success and initiative are closely related to the type of administrative organization as well as to the use of effective learning devices; pupil progress is affected by the adequacy of school accommodations as well as by promotion policy. Pupil success must be evaluated in terms of the curriculum, the organization of activities, and underlying purposes. This evaluation and indeed the curriculum itself are both evidences of the practical operation of a sound educational philisophy. The whole educational program is influenced directly by the standard conditions of operation set by the limitations of the school budget. Thus, research extends to the interrelated fields of instruction, curriculum, personnel, material, budget, and encompasses all phases of activity represented in the educational enterprise.

During the school year ended June, 1938 the division maintained its basic program of instructional research to provide administrators and teachers with objective and diagnostic evaluation of the success of learning activities. Various aspects of this program are reported currently in the mimeographed bulletins of the division. These bulletins furnish the basis for professional discussion and planning by superintendents, principals, and teachers.

A change in composition of our school population, with declines in elementary school enrollments and increases in those of secondary schools, was cause for careful study of existing school accommodations and their progressive adjustment to meet the changing needs of the school population. The exigencies of limited financial resources demand careful planning to avoid over-size classes and excessive teaching loads. Adequate determi-

mation of mental ability levels of pupils guides the adjustment of learning activities to individual capacities. However, the nature of the curriculum, and the spirit of coöperation among administrators, teachers, pupils, and community have large influence in determining the success of an educational program. In all these fields the Division of Educational Research has been active not only in the pursuit of individual research projects but in developing coöperative activity in the coördinated study of common problems. Participation in a research project enhances appreciation of the significance of the findings. The research attitude is essential to good teaching and sound administration. Coöperative, broadly-diffused research activity insures live, vigorous, whole-hearted adjustment to the continually changing needs of pupils and the demands of the community.

Projects of the Research Division from October, 1937, to October, 1938, are as follows:

1. Preparation of a standard score scale to provide a single scale of test achievement throughout the secondary school period. The scale is based upon actual and estimated achievement of a standard secondary school population with a median IQ of 102. This scale allows for differences in the IQ levels of pupils taking different junior and senior high school subjects.

2. Development of expectancy score units based upon the predictive power of the IQ for achievement in specified tests. The expectancy score scale allows for differences in correlation between IQ's and specific subject test scores.

3. Studies of relationships between promotion rates and other factors in junior high schools showing: (1) some correlation between IQ and average school promotion rate, (2) no relationship between achievement test scores related to mental ability and promotion rates. The introduction of new courses of study has resulted in increased rates of promotion, but the segregation of low ability pupils has not resulted in increased rates of promotion.

4. A study of remedial reading practices in junior and senior high schools summarizes methods of organization, pupil activities in the classroom, and remedial reading material.

5. Studies of mental ability distributions indicated that the tenth grade remained selective with respect to the IQ's of the pupils enrolled.

6. Studies of class size and teachers' assignments have resulted in adjustment formulas for the assignment of teachers to schools. Adjustments were made upon the basis of enrollment in shop and similar subjects.

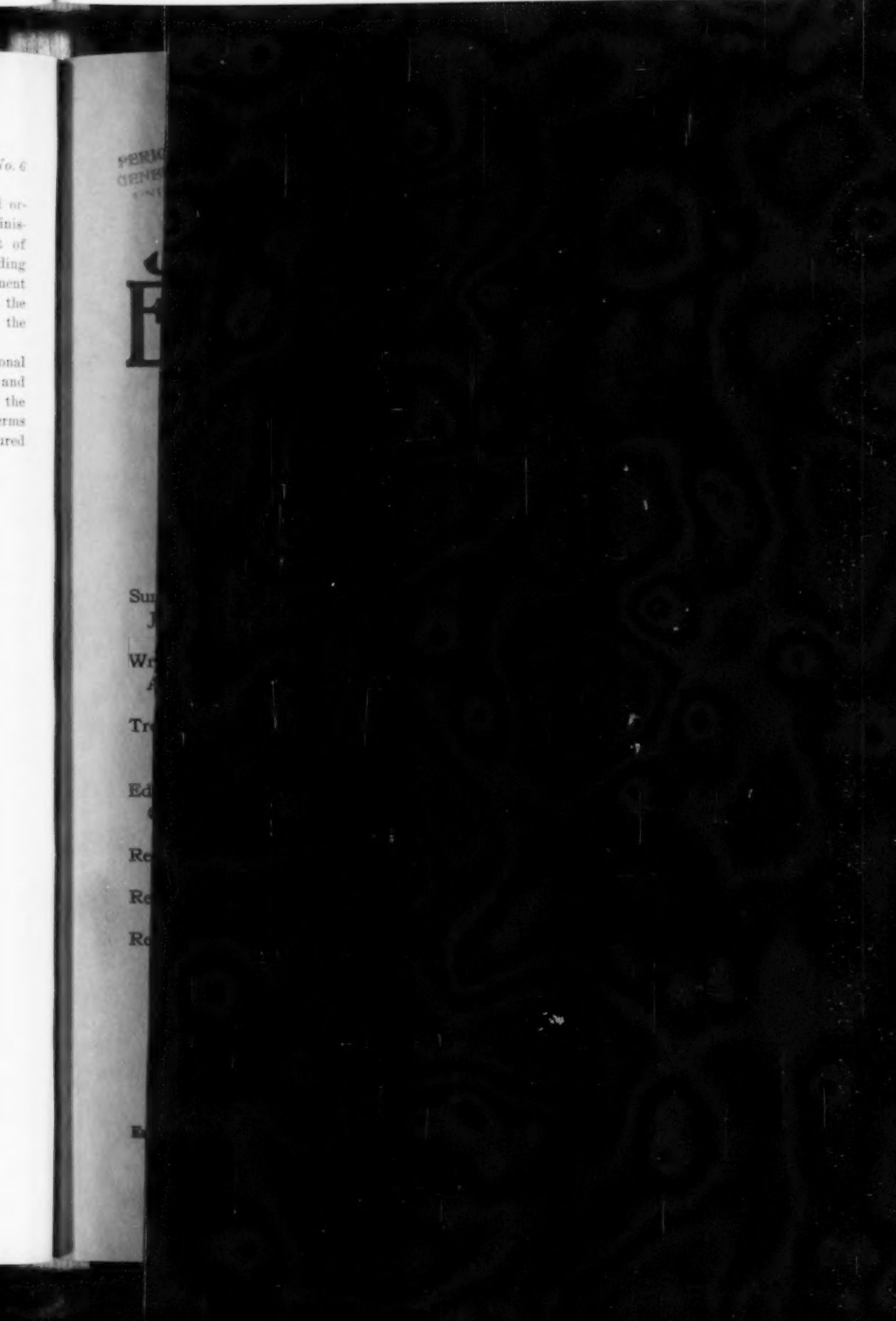
7. The study of mental ability and test achievement status of twelfth grade academic pupils shows by comparison with a similar study conducted ten years ago that the 1938 pupils are at least equally successful in tests of academic subjects. This comparison was made upon the basis of groups equated in raw scores in the Otis test. The actual mental ability level is higher in 1938 than in 1928. Selective forces operating between enrollment in the academic curriculum in the tenth grade and enrollment in liberal-arts colleges at the end of the second year do not cause important increases in IQ medians of the respective groups.

8. A test in English usage in the eighth grade indicates a very slow growth in ability in this field. The test results suggested class programs for remedial work in English usage.

9. A study of publicly supported higher education in large cities of the United States showed exceedingly wide variation in enrollments, student fees, and types of institution.

10. One study revealed the lack of effectiveness of failing marks as incentives to better effort in Latin.

11. The reorganization of instruction in English in two senior high schools was designed for the purpose of grouping pupils by ability in English expression rather than by the number of terms of English. An equated group study and comparison with results in other high schools shows that this reorganization has been effective in attaining higher scores in tests of mechanics of English.

12. Administrative research has been directed to problems of the internal organization and functioning of administrative departments, the assignment of teachers, school sites and school building needs, and particularly to the adjustment of existing school accommodations to the changing composition and needs of the school population.

13. The basic program of instructional research has involved the diagnosis and evaluation of pupil achievement, and the interpretation of these findings in terms of the capacities of pupils as measured by mental ability tests.